EdgeAccess

CANOGA PERKINS

9145EMP NID Software

Version 3.1

User's Manual

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Preface

About this Manual

This manual provides instructions on the configuration and operation of the 9145EMP Network Interface Device (NID) Version 3.1 software. The 9145EMP NID can be managed using the EIA-232 serial port through a VT100 terminal emulation program, through an Ethernet connection using Telnet, or by using SNMP.

How this Manual is Organized

This document contains both information and procedures organized in roughly chronological order. Starting from an introduction to the 9145EMP software, it continues with system requirements, initial implementation, and continued operation.

The document includes the following chapters:

- Chapter 1, *Introduction,* provides basic information about the software and navigation.
- Chapter 2, *Getting Started* describes how to set up and get started using the 9145EMP.
- Chapter 3, *System Configuration* describes how to configure the 9145EMP management features.
- Chapter 4, *Diagnostics* describes how to configure and perform routine network diagnostics.
- Chapter 5, *Port Information* describes the User port, Network port, Multipurpose port, and the Management UTP port.
- Chapter 6, *System Alarms & Logs* describes how to configure System Alarms and System Logs.
- Chapter 7, *Utilities* describes system utilities.
- Chapter 8, *Software Upgrade* describes how to upgrade the NID software.
- Chapter 9, *Link OAM* describes the Operations, Administration, and Maintenance functions, such as remote fault indication and remote loopback control, as specified by the IEEE 802.3ah standard.
- Chapter 10, *CoS Configuration* describes how to enable or disable Class of Service support that includes classification, queuing, scheduling and queue management functions for the 9145EMP.

- Chapter 11, *Service OAM* describes how to detect, isolate, and report connectivity faults that span networks comprised of multiple LANs, and monitor the performance of connections.
- Chapter 12, *VLAN Multiplexing* describes configuration steps for multiplexing customer frames to S-VLANs.

Contacting Technical Support

Contact Canoga Perkins technical support (1-800-360-6642), or your 9145EMP support supplier, for hardware and software support, including product repairs and part ordering. Please have the following information available:

- NID model and serial number
- NID software version
- Detailed description of the problem and specific questions
- Details from messages in system log (if available)
- Description of any troubleshooting steps already performed and results

Documentation Feedback

Because quality is our first concern at Canoga Perkins, we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. Forward your feedback to: techsupport@canoga.com. Provide the title and version number and as much detail as possible about your issue, including the topic heading, page number, and your suggestions for improvement.

Chapter 1

Introduction

1.0 About the 9145EMP Software

The Multiport 9145E (9145EMP) is a multiport version of the industry-leading 10/100/1000 9145E Network Interface Device (NID). The 9145EMP is equipped with four User Ports and two Network Ports. The User Ports are 10/100/1000 ports supporting dual media, as in the 9145E. The two Network Ports support 100/1000 optical SFPs only.

The 9145EMP supports Link Aggregation (IEEE 802.3ad) on the Network Ports.

The 9145EMP supports VLAN multiplexing of C-VLANs into S-VLANs. This feature allows customer frames to be multiplexed into S-VLANs through the use of a C-VLAN/S-VLAN Map.

1.1 Management Access

The 9145EMP can be managed through any of several access ports.

VT-100 Terminal The VT-100 terminal is used to manage the NID locally via the EIA-232 serial port, primarily to perform initial configurations on the NID before it is connected to the network.

Telnet Once the 9145EMP has been connected to your network, it can be accessed using Telnet. All commands and functions are available using standard Telnet software.

SNMP All commands and functions are also available using an SNMP manager. The 9145EMP supports SNMP v1/v2c/v3 and many standard MIBs as well as CP proprietary MIBs.

1.2 Management Security Features

The 9145EMP has comprehensive management access security features, including SNMPv3 authorization, RADIUS, password formatting, and user access controls. You can set values and options within the software that will work with the security protocols on your network. The four network security protocols listed below are supported. In addition, the 9145EMP provides options to define strong passwords, independent of the security protocols.

SNMPv3 Provides authentication and encryption of management traffic across a network.

Remote Access Dial In User Security (RADIUS) The RADIUS server maintains user account information. At login, the 9145EMP queries the server which authenticates the username and password and sends a message to the 9145EMP to allow the login. The RADIUS server can also be set up to require additional authentication information before accepting the user. If the

username or password is not valid, the RADIUS server sends a message to the 9145EMP to disallow the login and reject the user.

Secure Shell version 2 (SSH-2) SSH-2 provides authentication and encryption for a secure remote Telnet connection. SSH can be configured to provide unique User Accounts.

Secure File Transfer Protocol (SFTP) SFTP adds encryption to protect uploaded files during the file transfer process, such as for a software update.

1.3 Three Levels of Security

Most Service Provider management networks provision certain access levels to technicians, network administrators, and managers. Offering different access levels to critical applications allows network administrators to keep closer watch on the entire network.

The 9145EMP allows view-based access to be set up for user interface features and SNMP access. A capabilities file allows views to be defined in an ASCII file and downloaded to the NID. A three-level security system on the 9145EMP controls all user interface and SNMPv3 access.

All 9145EMP features require that the user have a certain access level. The logged in user or SNMPv3 manager's access level is used to validate and control access to the 9145EMP features. When accessing a menu item or an SNMP object, the user's access level is checked against the access level required for the feature. If the user's access level is sufficient, then the access is granted. If the user's access level is not sufficient, an error message is displayed in the status area, or an SNMP error is returned.

The three access levels are *supervisor, operator,* and *observe*r.

- In the default configuration, the *supervisor* access level is allowed complete access to all 9145EMP features including configuring the security system.
- The *operator* access level is allowed access to the 9145EMP features except those relating to the 9145EMP's security system. This level can be configurable by the administrator.
- The *observer* access level is allowed access to the 9145EMP features that do not modify the 9145EMP's configuration. This level can be configurable by the administrator.

1.4 Feature Access Level Configuration

The 9145EMP has a default assignment of access levels. Creating and downloading a text file called *9145EMP.cap* to the 9145EMP can change this assignment. This file contains mappings between module features and the access level required to access the feature.

As an example the entry that controls access to the Maximum Frame Size setting looks like *maxFrameSize=operator*. This entry indicates that to change the Maximum Frame Size, a user's account must have "operator" access level or greater.

The default *9145EMP.cap* file containing the 9145EMP built-in security rules is provided with the 9145EMP release. To modify the security rules, simply modify the provided *9145EMP.cap* file and download this modified file to the 9145EMP. The *9145EMP.cap* file is downloaded to the 9145EMP via the normal FTP/SFTP/TFTP in the same manner as downloading a firmware file to the 9145EMP. The same file may be downloaded to multiple 9145EMPs to ensure the same security rules.

If the file *9145EMP.cap* is not downloaded to the 9145EMP, then the default access level mappings in the 9145EMP are used. If a feature is not present in the file "9145EMP.cap" that is downloaded to the 9145EMP, then the default access level mapping in the 9145EMP is used. If errors are found in this file, these errors are displayed in the System log.

Chapter 2

Getting Started

2.0 Configuring Terminal Management

When you use the EIA-232 Serial Port for VT-100 sessions, Canoga Perkins suggests that you use HyperTerminal or another type of terminal emulation software on a PC.

NOTE: Microsoft Vista does not include HyperTerminal. If your PC uses the Vista operating system, you will need to install a terminal emulation program.

To set up HyperTerminal on your PC:

1. Select **Start** > **All Programs** > **Accessories > Communications > HyperTerminal**.
2. At the Connection Description dialog, select an icon and enter the name for the connection. Click **OK**.
3. At the **Connect To** dialog, select the **Connect Using** menu. Select the **COM** port and click **OK**.
4. Select the Port Settings tab from the **COM Properties** dialog. Make the following selections:
    a. Bits per second: 9600 bps
    b. Data bits: 8
    c. Parity: None
    d. Stop bits: 1
    e. Flow control: None
6. Click **OK**.
7. Go to **File > Properties >Settings** and change the Emulation setting from *Auto detect* to *VT100*.
8. HyperTerminal connects to the system and the VT100 terminal emulation starts.

2.1 Setting Up SNMP Network Management

The 9145EMP communicates with CanogaView or your Network Management Platform either in-band, via the Network port, or out of band, via the Management UTP port.

2.1.1 About MIBs

To communicate with the 9145EMP using SNMP, standard Management Information Bases (MIBs) are required on your Network Management Platform. Refer to "Supported MIBs" on page 10 for a list of MIBs.

Additionally, Canoga Perkins Private MIBs are needed on the Management Platform to manage tasks specific to the Canoga Perkins 9145EMP. The Canoga Perkins Private MIBs are available for download in the Client Support area of the Canoga Perkins web site. Go to www.canoga.com, then click on **Client Support**.

NOTE: To log in to the client site or secure site, use the serial number of the 9145EMP to register.

2.1.2 9145EMP Set-up

Several TCP/IP and SNMP parameters must be configured before you can accessing the 9145EMP from CanogaView or your Management Platform. These parameters include TCP/IP Address, Authorized Host List and Privileges. These parameters are initialized using a VT-100 Terminal connected to the RS-232 Serial Port. Refer to "System Configuration Menu" on page 11 for details on configuring these parameters.

2.2 Management User Interface

The Management User Interface for the 9145EMP provides a menu driven interface for setup, monitoring, and diagnostics. You can access the screens directly by connecting to the serial port of the 9145EMP or using Telnet.

A typical screen (Figure 2-1) includes standard descriptions and reference designations. Use this and other screens to configure the system, set operational parameters, and verify the system status. All screens use a common method for navigation.

NOTE: Status screens do not have selectable items.

Use the following methods to navigate screens:

- When a menu item is highlighted, press the **Space bar** to view the options for that item.
- Press **Tab** to move the highlight to the next column.
- Press **Enter** to select the highlighted option for a menu item or to go to the next line.
- Press **Esc** once to cancel an action or to return to the previous screen.

To select an item from a screen menu enter the menu item number. For example, you would type 6 and press **Enter** to select "Utilities" as shown in Figure 2-1.

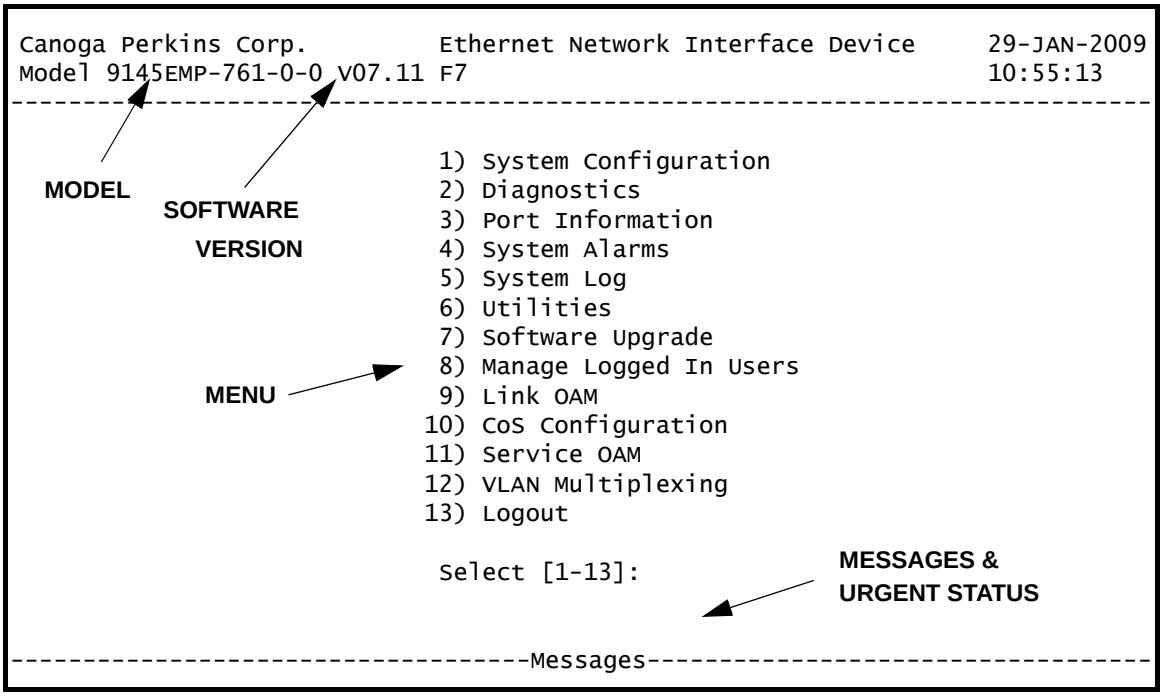

Figure 2-1 Screen Format

2.3 Login

The first screen is the Login screen (Figure 2-2). Type your Username and press **Enter**. The Password prompt appears. Type your Password and press **Enter**. If the Username or Password are incorrect, you will be returned to the Username Prompt and the message *Invalid Username/ Password entered* will be displayed.

CAUTION: The default username and password is* admin *(lower case). Canoga Perkins strongly recommends you change the default username and password during your initial configuration session.

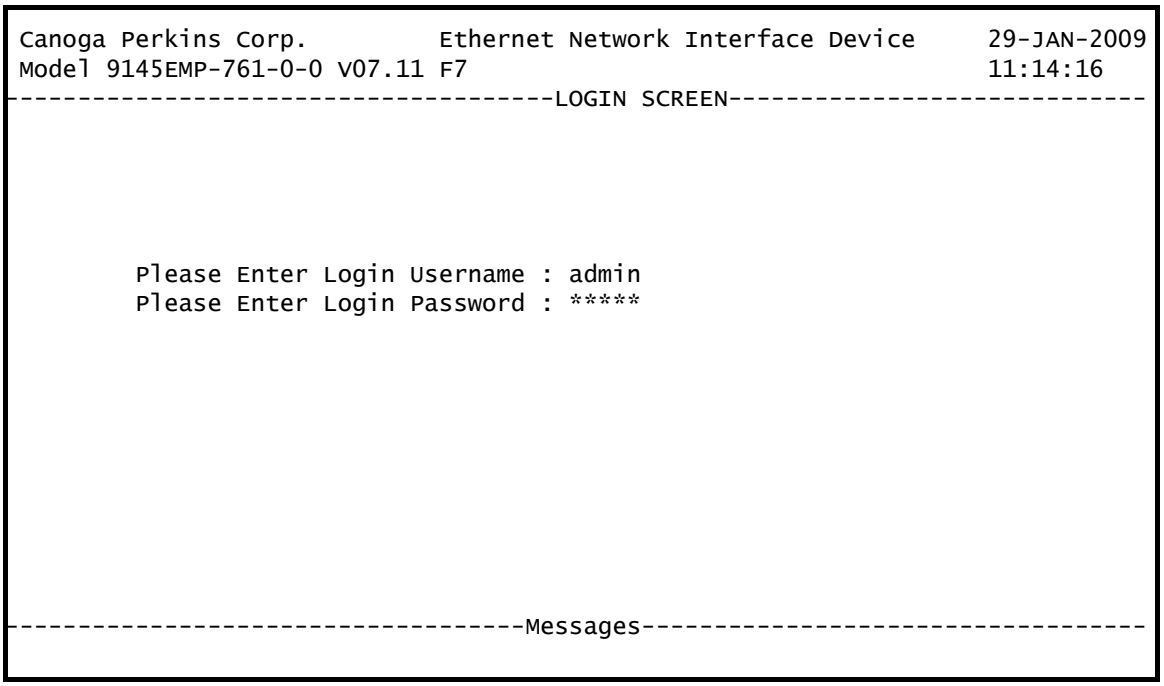
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 11:14:16
LOGIN SCREEN
Please Enter Login Username : admin
Please Enter Login Password : *****
Messages

Figure 2-2 Login screen

When you successfully log in, the Main Menu (Figure 2-3) opens. Use the Main Menu to access all 9145EMP functions, including setup, diagnostics, and reports.

See the sections "Account Configuration" on page 29 and "Password Configuration" on page 26 for information about configuring you account and changing your password.

CAUTION: If you lose both your Username and Password, return the unit to Canoga Perkins for Factory Service and reset.

2.4 Main Menu

Following is a brief description of the Main Menu items.

1. **System Configuration** The System Configuration menu is used to view and set values for system information and TCP/IP management communications parameters.
2. **Diagnostics** The Diagnostics menu is used to set up various troubleshooting tests, including Loopback, Latency/Jitter, PING tests, or Cable Diagnostic.
3. **Port Information** The Port Information menu is used to ascertain the current conditions for all ports in the 9145EMP, to set and view the configuration information for specific ports, check Link Status and Layer 2 Statistics and configure Link Aggregation functionality.
4. **System Alarms** The System Alarms screen is used to view current alarm conditions.
5. **System Log** The System Log screen displays a list of recent traps, alarms, and events.
6. **Utilities** The Utilities menu is used to set-up and display basic functional information.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7                                     10:55:13
-----------------------------------MAIN MENU---------------------------------

                              1) System Configuration
                              2) Diagnostics
                              3) Port Information
                              4) System Alarms
                              5) System Log
                              6) Utilities
                              7) Software Upgrade
                              8) Manage Logged In Users
                              9) Link OAM
                             10) CoS Configuration
                             11) Service OAM
                             12) VLAN Multiplexing
                             13) Logout


                              Select [1-13]:
```

Figure 2-3 Main Menu

7. **Software Upgrade** The Software Upgrade screen is used to download and install new firmware using TFTP, swap firmware banks, and reset the 9145EMP.
8. **Manage Logged In Users** The Manage Logged In Users screen is used by the administrator to view current users, and to terminate user sessions when required.
9. **Link OAM** The OAM menu is used to set, change, and view various link layer operational, administration and maintenance (OAM) functions.
10. **CoS Configuration** The Class of Service (CoS) Configuration menu is used to enable or disable classification support, and to establish priority to queue mapping, set up queue configuration, create drop profiles, and view queue statistics.
11. **Service OAM** The Service OAM menu is used to configure Connectivity Fault Management.
12. **VLAN Multiplexing** The VLAN Multiplexing menu is used to configure VLAN Multiplexing.
13. **Logout** Logout terminates your current session.

2.5 Supported MIBs

This section lists all supported MIBs including Standard MIBs and the Canoga Perkins MIBs.

Table 2-1 Standard MIBs	
mib-2.my	dot3.oam.my
ifmib.my	ping.my
rmon.my	rmon2.my
hcrmon.my	entitymib.my
cfm.my	

Table 2-2 Canoga Perkins MIBs		
cp9145estatus.my	cplicense.my	cpsyslog.my
cpaccounts.my	cploopback.my	cpsystemlog.my
cpcablediag.my	cpmgmtstatus.my	cptrapconfig.my
cpcos.my	cpping.my	cptraptb.my
cpdot3oam.my	cpportconfig.my	cpvlanloopback.my
cpentitynaming.my	cppowersupply.my	cpvlanmux.my
cpentity.my	cpradius.my	
cpfanstatus.my	cpsecurity.my	
cphosttb.my	cpsfpstatus.my	
cpifmib.my	cpsntp.my	
cpipconfig.my	cp_soam_ext.my	
cplag.my	cpstatus.my	
cplatency.my	cpsysinf.my	

Chapter 3

System Configuration

3.0 System Configuration Menu

The System Configuration menu (Figure 3-1) allows you to access the screens where you can configure various management, IP, security, and alarm settings. The following section describes each item on the System Configuration menu.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7    Canoga 9145EMP 32 device         11:20:59
----------------------------------SYSTEM CONFIGURATION--------------------------

                              1) IP/SNMP Agent Configuration
                              2) Trap Configuration
                              3) Security Configuration
                              4) Account Configuration
                              5) System Information
                              6) RADIUS Client Configuration
                              7) SNTP Client Configuration
                              8) SYSLOG Client Configuration
                              9) Hardware Information

                                  Select [1-9]:
-----------------------------------Messages-------------------------------------
```

Figure 3-1 System Configuration Menu

3.1 IP/SNMP Agent Configuration

The IP/SNMP Agent Configuration screen (Figure 3-2) configures the Management IP, Test IP, and Auxiliary IP settings, and is used to add, edit, or delete Host Table and Trap Table entries.

The Management IP, Test IP, and Auxiliary IP Addresses are used for managing and conducting testing on a TCP/IP network.

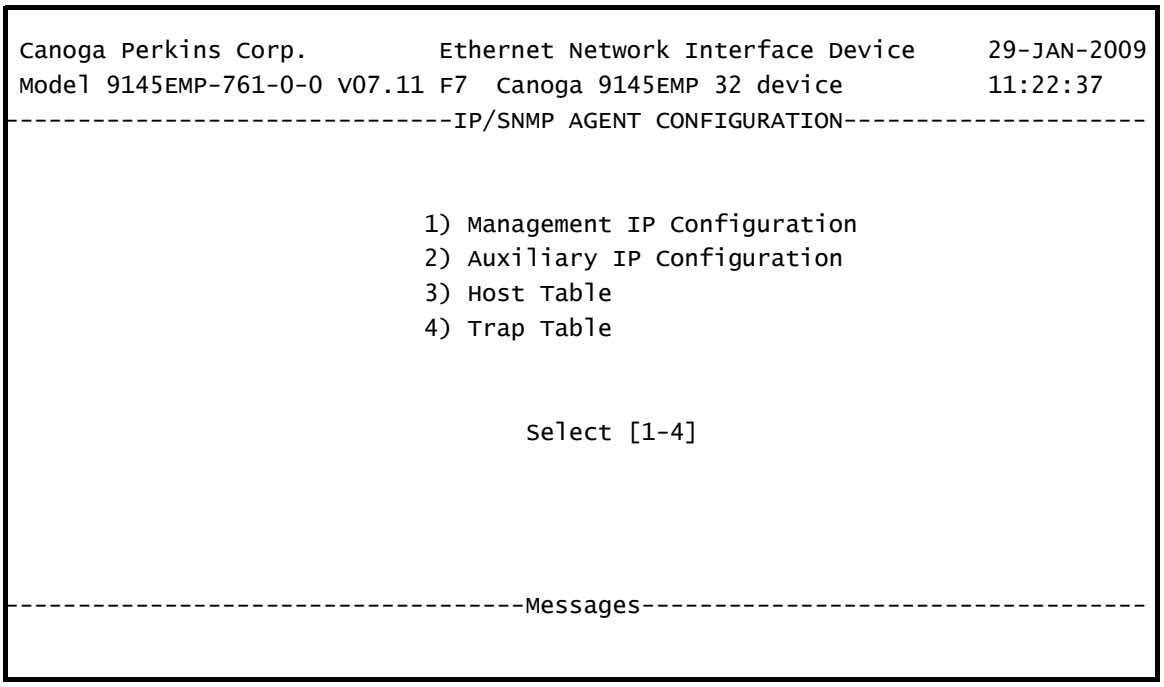
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 11:22:37
IP/SNMP AGENT CONFIGURATION
1) Management IP Configuration
2) Auxiliary IP Configuration
3) Host Table
4) Trap Table
Select [1-4]
Messages

Figure 3-2 IP/SNMP Agent Configuration screen

3.1.1 Management IP Configuration

On the IP/SNMP Agent Configuration screen (Figure 3-2), type 1 and press **Enter**. The Management IP Configuration screen (Figure 3-3) opens.

Use this screen to configure the Management IP of the 9145EMP, including the subnet mask, gateway, and management VLAN, and to configure which ports can be used for management access. See your network administrator for information and help with determining the appropriate parameters.

1. **Manager IP Address** Sets the 9145EMP Manager IP Address.

   Subnet Mask Sets the 9145EMP Manager IP Subnet Mask.

   Default Gateway Sets the IP Address of the Default Gateway.

2. **Manager Port** Used to select the port(s) to allow Management Communication access. Options are: Network Port, MGMT UTP Port, and Disabled.

3. **Manager VLAN Tagging** Enables or disables the use of a Management VLAN. The tags are 802.1ad compliant. The default setting is Untagged. Options are: Untagged, S-Tagged, C-Tagged, or Double tagged. If you selected "MGMT UTP Port," only Untagged or C-Tagged are allowed. If you select "MGMT UTP Only," only untagged and C-Tagged are allowed.

4. **Manager S-VLAN ID** If Manager VLAN Tagging is set to S-Tagged or Double Tagged, you can set the S-VLAN Tag ID between 1 and 4094.
5. **Manager C-VLAN ID** If Manager VLAN Tagging is C-Tagged or Double Tagged, you can set the C-VLAN Tag ID between 1 and 4094.

CAUTION: The Manager IP Address, Subnet Mask, and Gateway address can be changed when locally or remotely connected. When you change the Management IP Configuration via remote access, you will be automatically disconnected when the Gateway address is changed. You will need to reconnect using the updated Manager IP Address, Subnet Mask, and Gateway address.

```
Canoga Perkins Corp.        Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device         11:43:26
------------------------------MANAGEMENT IP CONFIGURATION----------------------

In-band Manager MAC Address      00 40 2A 04 12 D0
Manager MAC Address (MGMT UTP)   00 40 2A 04 12 D2
Manager Port Status              UP


1)  Manager IP Address           192.168.092.032
    Subnet Mask                  255.255.255.000
    Default Gateway              192.168.092.001
2)  Manager Port                 MGMT UTP Port Only
3)  Manager VLAN Tagging         Untagged
4)  Manager C-VLAN ID            0
5)  Manager S-VLAN ID            0
6)  Test IP Address              000.000.000.000
    Test Subnet Mask             255.255.255.000
7)  Test Port                    No Ports Allowed
8)  Telnet Security              Disabled
9)  Reply to Broadcast Ping      Disabled

                                 Select [1-9]:
```

Figure 3-3 Management IP Configuration screen

6. **Test IP Address** Sets the IP Address for optional test features.

   Test Subnet Mask Sets the Subnet Mask for optional test features.
7. **Test Port** Used to select which port(s) allow access to the Test IP address. Options are: USR Port 1, USR Port 2, USR Port 3, or USR Port 4.
8. **Telnet Security** Enables or disables checking if the host initiating the Telnet session is listed in the host table. If Telnet Security is enabled the host must be included as part of the host table. Default is disabled, which allows access from all hosts.

9. **Reply to Broadcast Ping** Enables or disables the 9145EMP reply to ICMP packets with a broadcast IP Host Address in the Manager IP subnet. Broadcast Ping replies are an ICMP packet and are rate limited to 100pps. Default is disabled.

3.1.2 Auxiliary IP Configuration

On the IP/SNMP Agent Configuration screen (Figure 3-2), type 2 and press **Enter**. The Auxiliary IP Configuration screen (Figure 3-4) opens.

The Auxiliary IP is an additional IP address that is provided for testing and connectivity only. It allows the 9145EMP to be PINGed without allowing Telnet or Management access that could be disruptive. The Auxiliary IP rate is limited to 500 pings per second. This allows connectivity and rudimentary performance testing from subscriber/user VLANs without compromising network security.

To configure the parameters, type the corresponding number and press **Enter**. Enter data or press the Space bar to view the configuration choices for the parameters described below.

Separate tagging configuration is necessary for User Side and Network side ports. All ports on the user side must share the same tagging configuration.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7   Canoga 9145EMP 32 device          11:45:26
------------------------------AUXILIARY IP CONFIGURATION----------------------

1)  Auxiliary IP Address              000.000.000.000
    Auxiliary Subnet Mask             255.255.255.000
2)  Auxiliary Port                    No Ports Allowed
3)  Aux VLAN Tagging on Network ports Untagged
4)  Aux C-VLAN ID on Network ports    0
5)  Aux S-VLAN ID on Network ports    0
6)  Aux VLAN Tagging on User ports    Untagged
7)  Aux C-VLAN ID on User ports       0
8)  Allow Any Vlan                    Disabled
9)  Aux IP Rate Limiting              Enabled

                                 Select [1-9]:
```

Figure 3-4 Auxiliary IP Configuration screen

1. **Auxiliary IP Address** Sets the 9145EMP Auxiliary IP Address.

   Auxiliary Subnet Mask Sets the 9145EMP Auxiliary IP Subnet Mask.
2. **Inband Auxiliary Port** Describes the Auxiliary IP address ports. Options are: USR 1, USR 2, USR 3, USR 4, Network Port, or Disabled.
3. **Auxiliary VLAN Tagging on Network ports** Describes the tagging mode for the frames sent and received when the Auxiliary IP address is configured on the Network Port. Options are: Untagged, S-Tagged, or Double Tagged.

4. **Auxiliary C-VLAN ID on Network ports** Sets the C-VLAN ID value (between 1 and 4094). Valid if the Auxiliary VLAN Tagging mode on Network ports is set to Double Tagged.
5. **Auxiliary S-VLAN ID on Network** Sets the S-VLAN ID value (between 1 and 4094). Valid if the Auxiliary VLAN Tagging mode on Network ports is set to Double Tagged or S-Tagged. The value defaults to 0 if any of the other type of tagging modes are selected.
6. **Auxiliary VLAN Tagging on User ports** Describes the tagging mode for the frames sent and received when the Auxiliary IP address is configured on any of the User Ports. Options are Untagged or C-Tagged.
7. **Auxiliary C-VLAN ID on User ports** Sets the C-VLAN ID value (between 1 and 4094) for the C-Tags on User Ports. Valid if the Auxiliary VLAN Tagging mode on User Ports is set to C-Tagged.
8. **Allow any VLAN** If this option is enabled, frames addressed to the Auxiliary IP address are processed regardless of their VLAN tagging. All responses on such frames are tagged with the received VLAN ID. Frames initiated by the NID will be still tagged with the configured encapsulation (Options 3 to 7 above). If this option is disabled, received frames will only be processed if they have the VLAN ID set on this screen.
9. **Auxiliary IP Rate Limiting** Specifies whether the maximum limit of 500 frames per second is enforced for frames received on the Auxiliary IP address.

3.1.3 Host Table

On the IP/SNMP Agent Configuration screen (Figure 3-2), type 3 and press **Enter**. The Host Access Table screen (Figure 3-5) opens.

Use this screen to configure the 9145EMP to send and receive SNMP, FTP, and Telnet traffic to the Managing Host IP address, and access from specific Telnet clients when Telnet security is enabled. Use the Host Access Table to configure access by each host including access type and privileges (SNMP, FTP, Telnet).

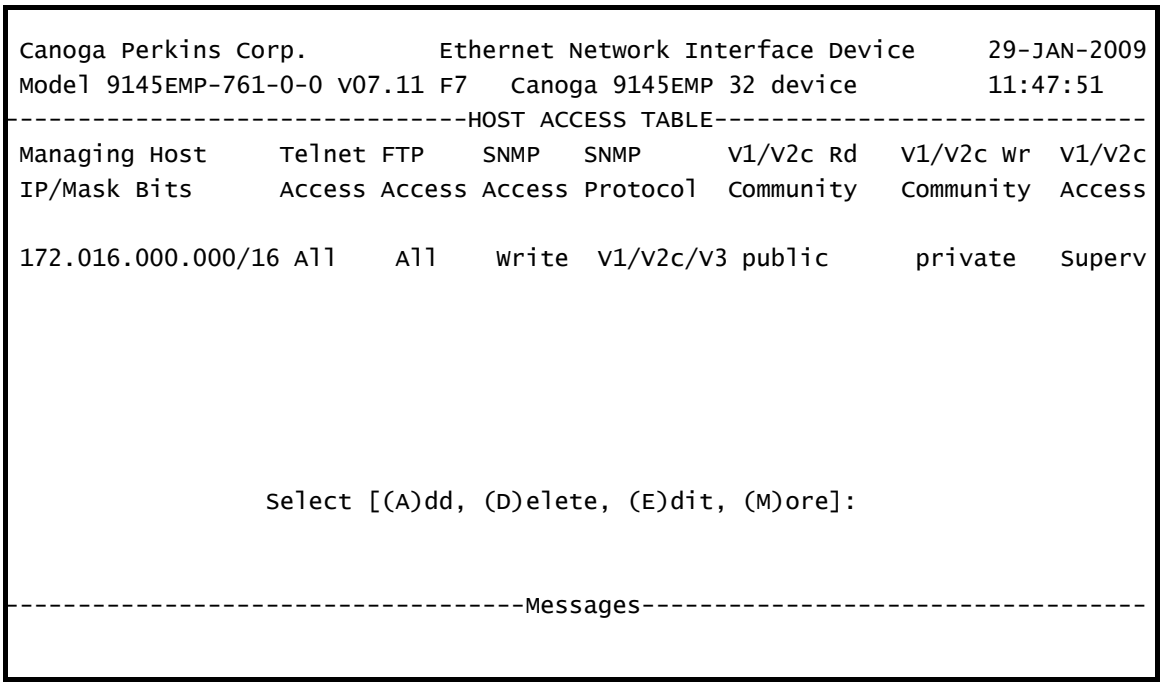

Figure 3-5 Host Access Table screen

3.1.3.1 Add or Edit a Managing Host IP

To add a Managing Host IP, from the Host Access Table screen, type A and press **Enter**. To edit an existing Managing Host IP select Edit (E). To delete a Managing Host IP select Delete (D). The Edit Host Access screen (Figure 3-6) opens.

1. Type the Managing Host IP address to add to the Host Access list and press **Enter**.
2. Type the IP Mask Size (default value 32) and press **Enter**. To have an entire subnet access the 9145EMP, enter the mask size for the subnet.
3. To change Telnet Access, type 1 and press **Enter**. Press the Space bar to select Telnet and SSH, Telnet Only, SSH Only, or None.
4. To change FTP access, type 2 and press **Enter**. Press the Space bar to select FTP and SFTP, FTP Only, SFTP Only, or None. Press **Enter** to select the parameter.
5. To change SNMP Access parameters, type 3 and press **Enter**. Press the Space bar to select Read, Write, or None. Press **Enter** to select the parameter.

6. To change the SNMP Protocol parameters, type 4 and press **Enter**. Press the Space bar: V1/V2c/V3, V1/V2c, or V3 using the Space Bar. Press **Enter** to select the parameter.

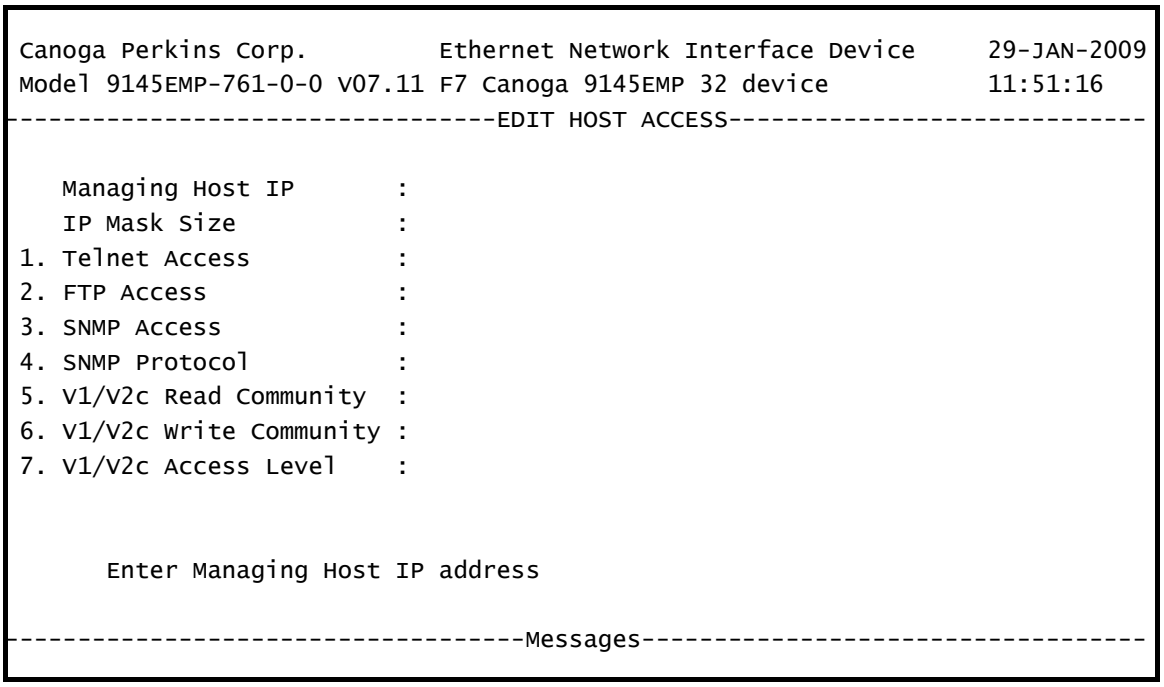
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 11:51:16
EDIT HOST ACCESS
Managing Host IP :
IP Mask Size :
1. Telnet Access :
2. FTP Access :
3. SNMP Access :
4. SNMP Protocol :
5. V1/V2c Read Community :
6. V1/V2c Write Community :
7. V1/V2c Access Level :
Enter Managing Host IP address
Messages

Figure 3-6 Edit Host Access screen

7. To change V1/V2c Read Community, type 5 and press **Enter**. Type the desired V1/V2c Read Community and press **Enter**.
8. To change the V1/V2c Write Community, type 6 and press **Enter**. Type the desired V1/V2c Write Community and press **Enter**.
9. To change the V1/V2c Access Level, type 7 and press **Enter**. Press the Space bar to select Operator, Supervisor, or Observer. Press **Enter** to select the parameter.
10. Press **Esc** to return to the Host Access Table screen.

NOTE: SNMP V3 security parameters are configured per user account on the Edit User Account screen. From the System Configuration screen type 4 and press Enter to open the Account Configuration screen, then type E to edit an account.

3.1.4 Trap Table

On the IP/SNMP Agent Configuration screen (Figure 3-2), type 4 and press **Enter**. The Trap Notification Destination Table screen (Figure 3-7) opens.

The Trap Table screens are used to configure the SNMP Trap Managers.

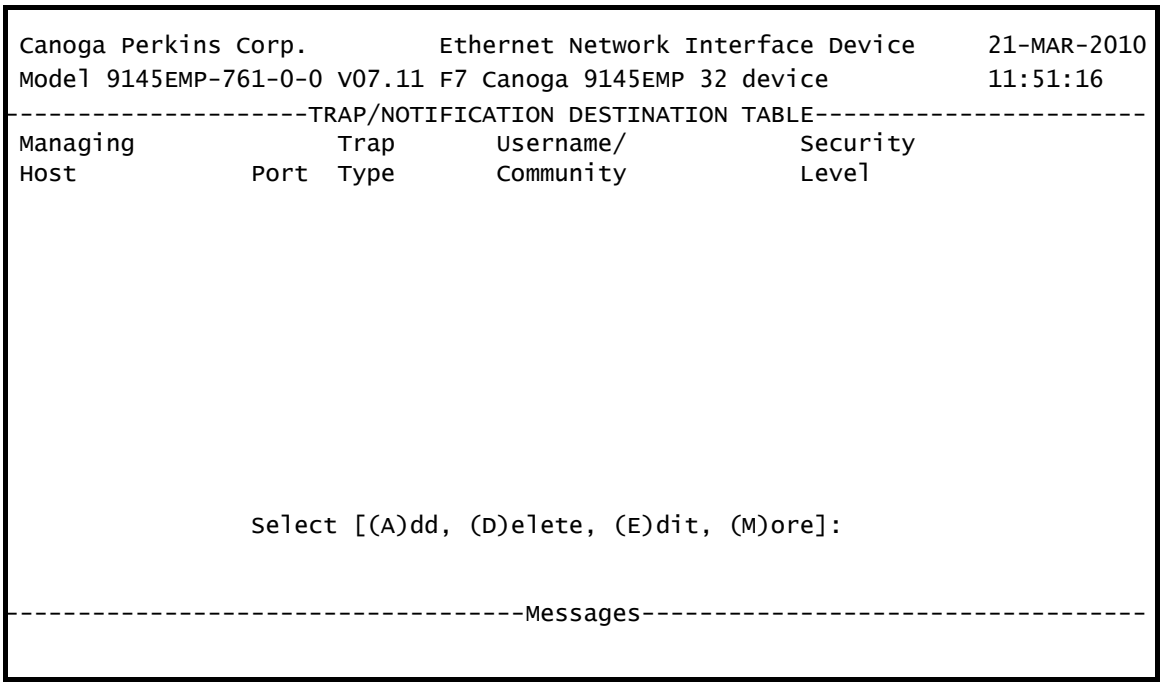

Figure 3-7 Trap/Notification Destination Table screen

3.1.4.1 Adding or Editing a Trap Table

1. To add a Managing Host IP address, from the Trap Notification Destination Table screen (Figure 3-7), type A and press **Enter** (to edit, type E and press **Enter**). The Edit Trap Notification Type screen open (Figure 3-8)
2. Type the Managing Host IP address and press **Enter**.1
3. Type the Trap/Notification Port and press **Enter**.

   The default value is 162 for regular SNMP managers (163 for CanogaView). Any port numbers from 1 to 65535 can be used to receive traps. Check with your IT manager to ensure the port setting is correct.

NOTE: Each Notification Type has a different configuration procedure. Follow the specific procedure for the Notification Type selected.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7   Canoga 9145EMP 32 device         11:53:23
---------------------------------EDIT TRAP/NOTIFICATION TYPE-----------------

   IP Address              :
   Trap/Notification Port  :
   Notification Type       :









                    Enter Managing Host IP address
-----------------------------------Messages-----------------------------------
```

Figure 3-8 Edit Trap/Notification Type screen

```
Canoga Perkins Corp.         Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7   Canoga 9145EMP 32 device        11:53:23
--------------------TRAP/NOTIFICATION DESTINATION TABLE----------------------
Managing              Trap       Username/            Security
Host            Port  Type       Community            Level

172.002.015.032 162   V2c-Inform Private              N/A
172.002.145.011 162   V3-Trap    admin                Auth/Priv
172.016.002.034 162   V3-Inform  admin                Auth/Priv
172.016.150.014 162   V1-Trap    public               N/A




                Select [(A)dd, (D)elete, (E)dit, (M)ore]:


-----------------------------------Messages-----------------------------------
```

Figure 3-9 Trap/Notification Destination Table screen

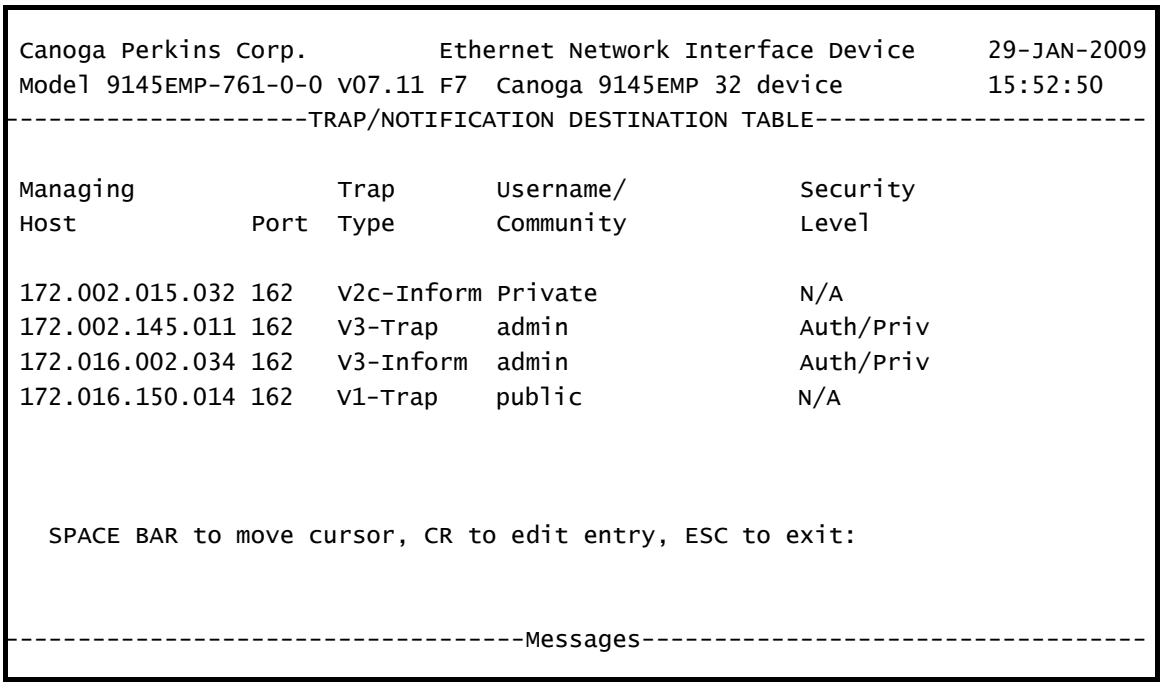
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 15:52:50
TRAP/NOTIFICATION DESTINATION TABLE
Managing Host
Port
Trap Type
Username/ Community
Security Level
172.002.015.032 162 V2c-Inform Private N/A
172.002.145.011 162 V3-Trap admin Auth/Priv
172.016.002.034 162 V3-Inform admin Auth/Priv
172.016.150.014 162 V1-Trap public N/A
SPACE BAR to move cursor, CR to edit entry, ESC to exit:
Messages

Figure 3-10 Edit Trap/Notification Type screen

4. Select the Notification Type for this SNMP host. Selections are: V1-Trap, V2c-Trap, V2c-Inform, V3-Trap, and V3-Inform.
   - **If you select V1-Trap or V2c-Trap** (Figure 3-11):
     a. Enter the Community Name and press **Enter**.
     b. Press **Esc** to return to the Trap Table screen (Figure 3-9).

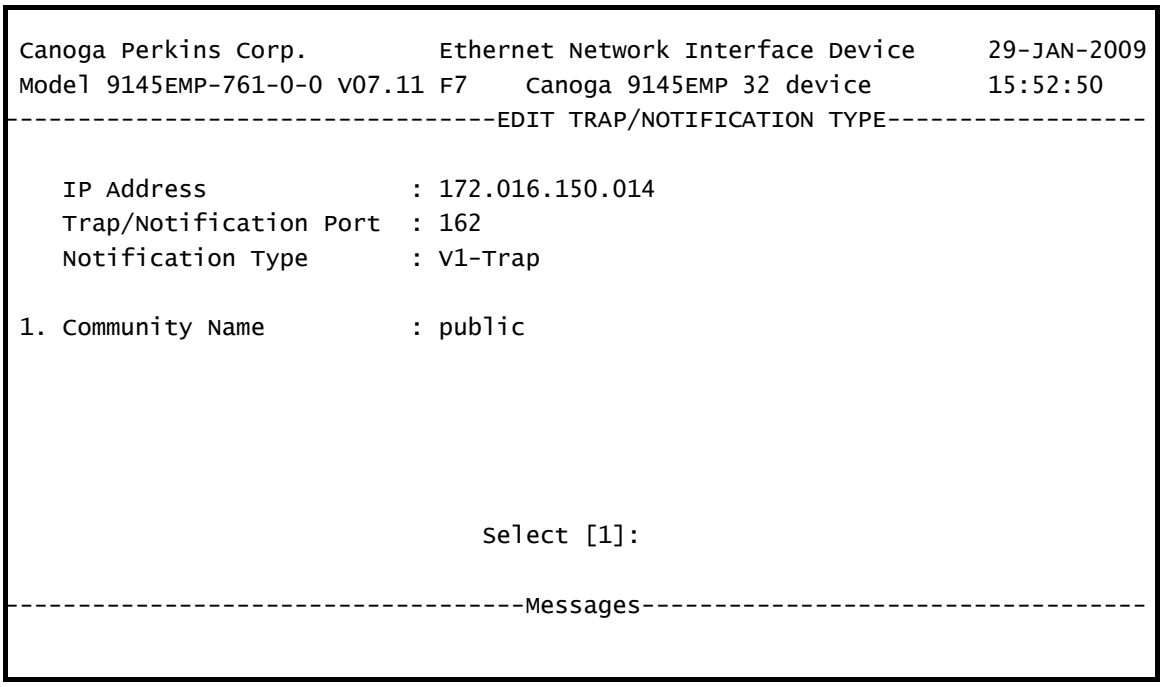
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 15:52:50
EDIT TRAP/NOTIFICATION TYPE
IP Address : 172.016.150.014
Trap/Notification Port : 162
Notification Type : V1-Trap
1. Community Name : public
Select [1]:
Messages

Figure 3-11 V1-Trap or V2c-Trap Notification Type Parameter

- **If you select V2c-Inform** (Figure 3-12):
  a. Enter the Community Name.
  b. Accept or revise the Retries parameter (default is 3).
  c. Accept or revise the Timeout in Seconds parameter (default is 5).
  d. Press **Enter** and then press **Esc** to return to the Trap Table screen (Figure 3-9).
- **If you select V3-Trap** (Figure 3-13):
  a. Press the Space bar to select the Security Name and press **Enter**.
  b. Press the Space bar to select the Security Level (No Auth/No Priv, Auth/No Priv, or Auth/Priv) and press **Enter**.
  c. Press **Esc** to return to the Trap Table screen (Figure 3-9).

```
Canoga Perkins Corp.         Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          15:52:50
--------------------------------EDIT TRAP/NOTIFICATION TYPE--------------------
   IP Address              : 172.002.015.032
   Trap/Notification Port  : 162
   Notification Type       : V2c-Inform

1. Community Name          : Private
2. Retries                 : 5
3. Timeout in Seconds      : 30




                               Select [1-3]:

-----------------------------------Messages-------------------------------------
```

Figure 3-12 V2c-Inform Notification Type Parameter

```
Canoga Perkins Corp.         Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device           15:52:50
---------------------------------EDIT TRAP/NOTIFICATION TYPE-----------------


   IP Address              : 172.002.145.011
   Trap/Notification Port  : 162
   Notification Type       : V3-Trap

1. Security Name           : admin
2. Security Level          : Auth/Priv



                               Select [1-2]:

----------------------------------Messages--------------------------------
```

Figure 3-13 V3-Trap Notification Type Parameter

4. **If you select V3-Inform** (Figure 3-15):

   a. Type the Security Name and press **Enter**.

   b. Type the SNMP Engine ID and press **Enter**.

   c. Press the Space bar to select the Authentication Protocol setting (MD5, SHA, or None) and then press **Enter**.

   d. Type the Authentication Password and press **Enter**. Type the password again and press **Enter**. The Authentication Key will automatically be entered. (It can be modified to match the SNMP manager's key if needed.)

   e. Press the Space bar to select the Privacy Protocol settings (DES or None) and then press **Enter**

   f. Type the Privacy Password, if required, and press **Enter**, then type the password again and press **Enter**. The Privacy Key will automatically be entered. (It can be modified to match the SNMP manager's key if needed.)

   g. Press the Space bar to select the Security Levels (No Auth/No Priv, Auth/No Priv, or Auth/Priv) and then press **Enter**.

```
Canoga Perkins Corp.          Ethernet Network Interface Device       29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device              15:52:50
----------------------------------EDIT TRAP/NOTIFICATION TYPE-------------------
    IP Address               : 172.016.002.034
   Trap/Notification Port    : 162
   Notification Type         : V3-Inform
 1. Security Name            : admin
 2. Engine ID
  : 646EDB8608522E7733B4E38D28ABC8A130D8D041
 3. Authentication Protocol  : SHA
 4. Authentication Password  : ***************
 5. Authentication Key       : FA9F82E713BAF2D2AC93DE8237BF5D1D5129261B
 6. Privacy Protocol         : DES
 7. Privacy Password         : ***************
 8. Privacy Key              : 8FDA9A99556396C7B32BA38EF58F6DE4
 9. Security Level           : Auth/Priv
10. Retries                  : 3
11. Timeout in Seconds       : 30
                                  Select [1-11]:
-----------------------------------Messages---------------------------------
```

Figure 3-14 V3-Inform Notification Type Parameter

   h. Accept the Retries entry or modify it by pressing **Backspace** and typing the new value and press **Enter** (default is 3).

   i. Accept the Timeout in Seconds entry or modify it by pressing **Backspace** and typing the new value and press **Enter** (default is 5).

   j. Press **Esc** to return to the Trap Table screen (Figure 3-8).

3.1.4.2 Delete a Trap Table Entry

1. To delete a Managing Host IP address, from the Trap Notification Destination Table screen (Figure 3-9), type D and press **Enter**.
2. Press the Space bar to select a Host IP address. To delete, press **Enter**. You will be prompted to confirm the deletion.
3. Press **Esc** to return to the IPSN MP Agent Configuration screen (Figure 3-2).

3.2 Trap Configuration

Trap configuration defines how various alarms events are handled. Traps can be configured to be logged, sent to the SNMP managers in the Trap Notification/Destination Table, or both logged and sent for each event. Traps can also be set to Disabled.

Trap Config Item	**Traps Affected**	**MIB Location**
Master Trap Control	All	
User Port Link Traps	linkUp (User Port)	ifmib.my
	linkDown (User Port)	ifmib.my
Network Port Link Traps	linkUp (Network Port)	ifmib.my
	linkDown (Network Port)	ifmib.my
Remote Fault Traps	cp9145EPortRemoteFaultReceived	cp9145EStatus.my
	cp9145EPortSendingRemoteFault	cp9145EStatus.my
	cp9145EPortRemoteFaultCleared	cp9145EStatus.my
Cold Start Traps	coldStart	v2-mib.my
Authentication Traps	cpAuthenticationFailure	cpMgmtStatus.my
Diagnostic Traps	cpPortLoopbackOn	cpLoopback.my
	cpPortLoopbackOff	cpLoopback.my
Entity Configuration Traps	entConfigChange	EntityMib.my
Fan/Power/Temperature Traps	cpMainBoardVoltageLevelsOK	cpStatus.my
	cpMainBoardVoltageLevelsOutOfRange	cpStatus.my
	cpDyingGasp	cpPowerSupply.my
	cpPowerSupplyFailed	cpPowerSupply.my
	cpPowerSupplyOverHighLimit	cpPowerSupply.my
	cpPowerSupplyUnderLowLimit	cpPowerSupply.my
	cpPowerSupplyOK	cpPowerSupply.my
	cpFanShutDownDueToLowTemperature	cpFanStatus.my
	cpFanOK	cpFanStatus.my

	cpFanSlow	cpFanStatus.my
	cpFanFailed	cpFanStatus.my
	cpTemperatureOverHighThresholdAlarm	cpStatus.my
	cpTemperatureHighThresholdAlarmCleared	cpStatus.my
	cpTemperatureWarningApproachingHighThreshold	cpStatus.my
	cpTemperatureHighThresholdWarningCleared	cpStatus.my
	cpTemperatureAlarmUnderLowThreshold	cpStatus.my
	cpTemperatureLowThresholdAlarmCleared	cpStatus.my
	cpTemperatureWarningApproachingLowThreshold	cpStatus.my
	cpTemperatureLowThresholdWarningCleared	cpStatus.my
SFP Traps	cpSfpRemoved	cpSfpStatus.my
	cpSfpInsertedInvalid	cpSfpStatus.my
	cpSfpInsertedValid	cpSfpStatus.my
	cpSfpTxOk	cpSfpStatus.my
	cpSfpTxWarning	cpSfpStatus.my
	cpSfpTxFailure	cpSfpStatus.my
Service OAM Traps	cpSoamXConnCcm	cp_soam_ext.my
	cpSoamErrorCcm	
	cpSoamRMepCcm	
	cpSoamMacStatus	
	cpSoamRDIDetect	
	cpSoamAISDetect	

The System Log contains the log of all enabled Trap events.

1. To configure Traps, select Trap Configuration (2) from the System Configuration menu. The Trap Configuration screen (Figure 3-15) opens.
2. Select the number of the trap group to change and press **Enter**. Press the Space bar to select Log Only, Send Only, Both Log And Send, or Disabled.

   The Master Trap Control setting will override all other trap settings. For example, if the Master Trap Control is set to Log Only, rather than set to Both Log And Send (as shown), all the other traps will only log alarm events, regardless of the individual trap settings. If the Master Trap Control is set to Log And Send, the individual traps will perform according to their individual settings. Setting the Master Trap Control setting to Disabled will disable all traps.
3. Press **Enter** to close the editing function and then press **Esc** to return to the System Configuration screen.

NOTE: The setting of the Master Trap Control overrides all other trap settings.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device            15:52:50
----------------------------------TRAP CONFIGURATION--------------------------

      1) Master Trap Control                        Log Only

      2) User Port Link Traps                       Both Log And Send
      3) Network Port Link Traps                    Both Log And Send
      4) Remote Fault Traps                         Both Log And Send
      5) Link Loss Forwarding Traps                 Both Log And Send

      6) Cold Start Traps                           Both Log And Send
      7) Authentication Traps                       Both Log And Send
      8) Diagnostic Traps                           Both Log And Send
      9) Entity Configuration Traps                 Both Log And Send
     10) Fan/Power/Temperature Traps                Both Log And Send
                                                    Both Log And Send

     12) SOAM Traps                                 Both Log And Send

                              Select [1-12]:
```

Figure 3-15 Trap Configuration screen

3.3 Security Configuration

The 9145EMP can be configured for Strong passwords. Use the Security Configuration screen to set or change the Password Configuration and the Lockout/Logout Configuration.

From the System Configuration screen, select Security Configuration (3). The Security Configuration screen (Figure 3-16) opens.

3.3.1 Password Configuration

Select the Password Configuration item to change by typing the corresponding number. Press **Enter** to close the editing function and then press **Esc** to return to the System Configuration screen. The 9145EMP permits strong passwords as follows:

1. **Minimum Length** The minimum number of alpha-numeric characters of a password. Enter a value between 0 and 15. A setting of 0 will allow you to log in without a password.
2. **Minimum Alpha Characters** The minimum number of alpha characters a password must contain. Valid alpha characters are a-z (lower case) and A-Z (capitalized). Enter a value between 0 and 15.
3. **Minimum Numeric Characters** The minimum number of numeric characters a password must contain. Valid numeric characters are 0-9. Enter a value between 0 and 15.

4. **Minimum Punctuation Characters** The minimum number of punctuation characters a password must contain. Valid punctuation characters are any non-space, non-alpha, and non-numeric characters. Valid punctuation characters include:

! @ # $ % ^ & * ( ) _ + - , < .

= ~ ‘ ; : ‘ “ [{] } \ | > / ?

```
Canoga Perkins Corp.         Ethernet Network Interface Device          29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7   Canoga 9145EMP 32 device              15:52:50
---------------------------SECURITY CONFIGURATION---------------------------------
  PASSWORD CONFIGURATION
 1. Minimum Length                     :  6
 2. Minimum Alpha Characters           :  0
 3. Minimum Numeric Characters         :  0
 4. Minimum Punctuation Characters     :  0
 5. Maximum Consecutive Character Types :  0
 6. Maximum Same Character             :  0
 7. Allow username in password         :  Enabled
 8. Password Expiration Time           :  0
 9. Password Reuse Count               :  0
  LOCKOUT/LOGOUT CONFIGURATION
 10. Lockout After Failed Attempts     :  0
 11. Lockout Type                      :  Hard
     Lockout time                      :  0
 12. Display Lockout Message           :  Disabled
 13. Lockout Message                   :  Account has been locked out
 14. Lockout Craft Port                :  Disabled
 15. Inactivity Logout time (mins)     :  0
                                Select [1-15]:
```

Figure 3-16 Security Configuration screen

5. **Maximum Consecutive Character Types** The number of alpha, numeric, or punctuation characters that can be used consecutively. Enter a value from 1 through 15.
6. **Maximum Same Character** The maximum number of times that any character may be repeated within the password. This includes alpha, numeric or punctuation character types. Enter a value between 0 and 15.
7. **Allow Username In Password** Determines if the user's account name can be within any part of the password. Press the Space bar to select Enabled or Disabled.
8. **Password Expiration Time** The number of days until the password expires and a new one is required. Enter a value between 1 and 365. A setting of 0 disables this feature.

   If the password expires, the Supervisor will have to reset the password. If the Supervisor password has expired the 9145EMP NID will have to sent to Canoga Perkins Technical Support to be reset.
9. **Password Reuse Count** The number of password expirations a user must wait until a password can be reused. When set to 0, the user can reuse their current password with no count limitation. When set to 1, a password can be reused after one password reset.

3.3.2 Lockout/Logout Configuration

Select the Lockout/Logout Configuration item you want to change by typing the corresponding number. Press **Enter** to close the editing function and then press **Esc** to return to the System Configuration screen.

10. **Lockout After Failed Attempts** The number of attempts a user may make before the account becomes disabled. The Lockout Type field controls the lockout behaviors. Enter a value between 1 and 15. A setting of 0 will disable this feature.
11. **Lockout Type** The options are *Hard* or *Timed*. Timed requires the user to wait a specified number of minutes before a retry. Hard requires the System Administrator to unlock the account. Press the Space bar to select Timed or Hard.

    Lockout Time The number of minutes that a user must wait before a retry. Enter a value between 0 and 30.
12. **Display Lockout Message** Specifies if a message will be displayed when an account has been locked. Refer to the Lockout Message in option 13. Press the Space bar to select Enabled or Disabled.
13. **Lockout Message** The text to be displayed if option 12 is Enabled. The message should be customized to list the person to contact in case an account is disabled. Enter a text message of up to 30 characters.
14. **Lockout Craft Port** Specifies whether the RS-232 serial port interface on the device should be locked to prevent using the serial interface to access the system. Press the Space bar to select Enabled or Disabled.
15. **Inactivity Logout Time** The number of minutes of inactivity before a user is automatically logged out. Enter a value between 1 and 30. A setting of 0 will disable this feature.

3.4 Account Configuration

Use the Account Configuration screen to add new accounts, edit existing accounts, or delete accounts. There must be at least one Supervisor account. The 9145EMP NID allows up to 24 accounts. Four telnet sessions may take place at the same time. Only one FTP session may take place at any time.

NOTE: Any action that affects the network configuration of the 9145EMP (that is, resetting the IP address) will disconnect all telnet sessions.

From the System Configuration menu, select Account Configuration (4). The Account Configuration screen (Figure 3-17) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device            15:52:50
-----------------------------ACCOUNT CONFIGURATION----------------------------
             Account   Access         Access                            Locked
Username     State     From           Level       Description            Out

admin        Enabled   UI/SNMPv3      Supervisor  Default Account          No
Obs          Enabled   UI/SNMPv3      Observer    New Account              No
Ope          Disabled  UI/SNMPv3      Operator    new account              No




                 Select [(A)dd, (D)elete, (E)dit, (M)ore]:

-----------------------------------Messages-----------------------------------
```

Figure 3-17 Account Configuration screen

1. **Username** The name of the new account you wish to add to the user list.
2. **Account State** Whether the account is enabled or disabled.
3. **Access From** Determines from where the user can access this account.
4. **Access Level** The security level required to access this account.
5. **Description** The account type.
6. **Locked Out** Whether the Supervisor has locked the user out of the system.

3.4.1 Three Levels of Security

A three-level security system on the 9145EMP controls all user interface and SNMPv3 access.

Most Service Provider management networks provision certain access levels to technicians, network administrators, and managers. Offering different access levels to critical applications allows network administrators to keep closer watch on the entire network.

All 9145EMP features require a certain access level for access. The logged in user or SNMPv3 manager's access level is used to validate and control access to the 9145EMP features. When accessing a menu item or an SNMP object the user's access level is checked against the access level required for the feature. If the user's access level is sufficient, then the access is granted. If the user's access level is not sufficient, an error message is displayed in the status area or an SNMP error is returned.

The three access levels are *supervisor*, *operator*, and *observer*.

In the default configuration, the *supervisor* access level is allowed complete access to all 9145EMP features including configuring the security system. The *operator* access level is allowed access to the 9145EMP features except those relating to the 9145EMP's security system. This level can be configurable by the administrator.

The *observer* access level is allowed access to the 9145EMP features that do not modify the 9145EMP's configuration. This level can be configurable by the administrator.

3.4.2 Feature Access Level Configuration

The assignment of access levels has a default configuration built into the 9145EMP. Creating and downloading a text file called *9145e.cap* to the 9145EMP can change this assignment, however. This file contains mappings between module features and the access level required to access the feature. For example, the entry that controls access to the Maximum Frame Size setting looks like the following:

maxFrameSize=operator

This entry indicates that to change the Maximum Frame Size, a user's account must have *operator* access level or greater.

The *9145e.cap* file is downloaded to the 9145EMP via the normal FTP/SFTP/TFTP in the same manner as downloading a firmware file to the 9145EMP. The same file may be downloaded to multiple 9145EMP's to ensure that each is following the same security rules.

3.4.3 Add or Edit an Account

To add an account, from the Account Configuration screen (Figure 3-17), type A and press **Enter**. The Edit User Account screen (Figure 3-18) opens with all fields empty. When you have entered the account information, press **Esc** to return to the Account Configuration screen.

To edit an account, type E and press the Space bar to select an account. The Edit User Account screen (Figure 3-18) opens.

```
Canoga Perkins Corp.         Ethernet Network Interface Device       29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device             15:52:50
----------------------------------EDIT USER ACCOUNT-----------------------------------
   Username                         : Obs
1. Account State                    : Enabled
2. Access From                      : UI/SNMPv3
3. Access Level                     : Observer
4. Description                      : New Account
5. UI Password                      : ****************
6. UI Password Expires              : No
   UI Password Expires in (days)    : 0
7. Allow UI Lockout Of User         : Yes
8. Allow UI Logout Of User          : Yes
9. UI Login Locked State            : Unlocked
10.SNMPv3 Authentication Protocol   : None
11.SNMPv3 Authentication Password   : N/A
   SNMPv3 Authentication Key        : N/A
12.SNMPv3 Privacy Protocol          : None
13.SNMPv3 Privacy Password          : N/A
   SNMPv3 Privacy Key               : N/A
                                    Select [1-13]:
```

Figure 3-18 Edit User Account screen

Username The name of the new account you wish to add to the user list. Enter a name of up to 10 characters.

1. **Account State** Specifies whether the account is active. Press the Space bar to select Enabled or Disabled.
2. **Access From** Determines from where the user can access this account. Press the Space bar to select between UI, SNMPv3, and UI/SNMPv3.

NOTE: SNMP only cannot FTP.

3. **Access Level** Specifies the security level granted when you log in with this account. Press the Space bar to select Observer, Operator, or Supervisor.
4. **Description** Term used to describe the account type. Enter descriptive text up to 17 characters.
5. **UI Password** A password is only required if Access From is set to UI or UI/SNMPv3. Type the desired password and press **Enter**. Reenter the password. Passwords are limited to 15 characters.
6. **UI Password Expires** Determines whether the password will expire and required to be changed. Press the Space bar to select Yes or No.

   Password Expires in (days) Establishes the number of days each password can be used before a new password is required. Enter a number between 1 and 365. A setting of 0 will require a new password each time the account is opened.
7. **Allow UI Lockout Of User** Gives Supervisors the ability to lock users out of the system. Press the Space bar to select Yes or No.

8. **Allow UI Logout Of User** Gives Supervisors the ability to log users off the system. Press the Space bar to select Yes or No.
9. **UI Login Locked State** Determines the current state of the UI Login. Press the Space bar to select Locked or Unlocked.
10. **SNMPv3 Authentication Protocol** Sets the authentication protocol for SNMPv3 access. Press the Space bar to select None, MD5, or SHA.
11. **SNMPv3 Authentication Password** Used to enter the SNMPv3 authentication password. This password is not stored. It is used to generate the SNMPv3 authentication key. Type the desired password and press **Enter**. Reenter the password. The password is required to be between 8 and 15 characters. This field will be passed over if the SNMPv3 authentication protocol is set to **None**.

    SNMPv3 Authentication Key Displays the computed SNMPv3 authentication key. This is a field that is shared with an SNMPv3 management application to allow authenticated protocol exchanges.
12. **SNMPv3 Privacy Protocol** The privacy protocol used for SNMPv3 access. Press the Space bar to select None or DES.
13. **SNMPv3 Privacy Password** Used to enter the SNMPv3 privacy password. This password is not stored. It is used to generate the SNMPv3 privacy key. Type the desired password and press **Enter**. Reenter the password. The password is required to be between 8 and 15 characters. This field will be passed over if the SNMPv3 Privacy Protocol is set to None.

    SNMPv3 Privacy Key Displays the computed SNMPv3 privacy key. This is a field that must be shared with an SNMPv3 management application to allow private SNMPv3 protocol exchanges.

3.4.4 Delete an Account

NOTE: An account cannot be deleted while the user is logged in. In addition, you cannot delete the last supervisor account.

Before attempting to delete an account make sure the user is logged out. Use the following procedure to delete an account.

1. To delete an account, from the Account Configuration screen (Figure 3-17), type D and press **Enter**. The first User Account will be highlighted.
2. Press the Space bar to scroll through the user names to select the account. Press **Enter** to delete the highlighted account.
3. When deletions are completed, press **Esc** to return to the System Configuration menu.

3.5 System Information

The System Information screen is used to add or edit administrative and circuit information, such as the name of the 9145EMP, contact, location, customer, circuit, equipment codes and Common Language Equipment Identification (CLEI) information.

System Name, Contact, and Location are the same as the MIB-II variables sysName, sysLocation, sysContact.

1. From the System Configuration menu, select System Information (5) and press **Enter**. The System Information screen (Figure 3-19) opens.
2. Type the number of the parameter to enter information about, then press **Enter**.
3. Type new information or edit existing information and press **Enter**.
4. To return to the Main Menu, press **Esc**. Press **Esc** again to return to the System Configuration menu.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           15:52:50
------------------------------SYSTEM INFORMATION--------------------------------
1 System Name            : Canoga 9145EMP 32 device
2. Contact               : Contact
3. Location              : Canada
4. Customer              : Afore Solutions
5. Information           : Information1
                         : Information2
6. Circuits              : Circuits1
                         : Circuits2
7. Service Code          : 1234567890
8. Date-in-Service       : 03/04/2010
9. Date-Out-of-Service   : 03/01/2010
10. Equipment Type       : Test Equip
11. Equipment Code       : 1234567890
12. Vendor               : Canoga Perkins
13. CLEI                 : 1234567890
14. Mfg Date             : 01/01/2010

                                   Select [1-14]:
-----------------------------------Messages-----------------------------------
```

Figure 3-19 System Information screen

1. **System Name** The system name can be up to 25 characters long. It is displayed in the header under *Ethernet Network Interface Device*. If you are running multiple telnet sessions, you will be able to identify the NID you are viewing.
2. **Contact** Maximum of 25 characters.
3. **Location** Maximum of 25 characters.

4. **Customer** Maximum of 25 characters.
5. **Information** Two lines, maximum of 40 characters each.
6. **Circuits** Two lines, maximum of 25 characters each.
7. **Service Code** Maximum of 10 characters.
8. **Date-in-Service** The date when the 9145EMP was placed into service.
9. **Date-Out-of-Service** The date when the 9145EMP was last taken out of service.
10. **Equipment Type** Maximum of 10 characters.
11. **Equipment Code** Maximum of 10 characters.
12. **Vendor** Maximum of 25 characters.
13. **CLEI** Common Language Equipment Identification (CLEI) up to 10 characters.
14. **Mfg Date** An editable date field in the form [mm/dd/yyyy].

3.6 RADIUS Client

RADIUS (Remote Authentication Dial-In User Service) software support is provided for User Authentication.

RADIUS provides the ability to have user interface accounts to be maintained and authenticated by a RADIUS server. The RADIUS server also maintains user account information:

- **AccessFrom** Where the account can be used.
- **AccessLevel** The security access level for the user.
- **Description** The account description.
- **LogoutUser** Whether the user can be forcefully logged out.

When a user enters a username and password and RADIUS has been configured, the username and password is sent to the RADIUS server and is validated there. If valid, then the RADIUS server sends an accept message along with the above account information and the 9145EMP RADIUS client allows the user in with this configuration.

The RADIUS server may send a reject message in which case the user is not logged in. The RADIUS server may also send a challenge message if it has been configured to do so in which case the user is prompted for additional authentication information at which time the RADIUS server will then send an accept or reject message.

3.6.1 RADIUS client configuration

Up to two RADIUS servers can be configured. The RADIUS server that is consulted is determined by the server priority. The server with the lowest priority number is consulted first. If it does not respond, then the other RADIUS server is consulted (if configured). If both servers are configured with the same priority then a round-robin access is used; first one RADIUS server will be consulted and the next request will be sent to the other RADIUS server first. The server priorities are relative. That is, you could configure one server with priority 10 and the other with 20. The values of the numbers do not matter, just the relative values of the numbers (in this case 10 being less than 20). This is done to allow you to easily change the server priorities without having to edit both entries. If you had configured the servers with 10 and 20, you could make the

server with 20 have higher priority simply by changing its priority to 5; no need to change the one with 10. The RADIUS Client Configuration Client screen is shown in Figure 3-20.

1. **RADIUS Client Mode** Options: RADIUS then Local, Local then RADIUS, or None
2. **RADIUS then Local** When a user tries to log in, the username and password is passed to the configured Primary RADIUS Server first for authentication. If there is no connectivity to the Primary RADIUS Server, the RADIUS Client attempts to authenticate the login request on the Secondary RADIUS Server. If there is no connectivity to the Secondary RADIUS Server, the 9145EMP can then use the local database.
3. **Local then RADIUS** says that when a user tries to log in, the local user accounts database is consulted to try to authenticate the user. If the user cannot be authenticated by the local accounts database, then the RADIUS Server is consulted to authenticate the user.
4. **None** says that the RADIUS server is never used and all user access is authenticated by the local user accounts database.
5. **RADIUS Server IP Address** The IP address of the RADIUS server. If 0.0.0.0 then this server configuration will not be used.
6. **RADIUS Server Shared Secret** 16-character secret shared by the RADIUS server and the RADIUS client to encrypt sensitive RADIUS traffic on the wire. The value entered here must match what is configured into the RADIUS server.
7. **RADIUS Server Retries** The number of attempts to authenticate a user using this RADIUS server before giving up or using the alternate RADIUS server if configured. 0 - 10
8. **RADIUS Server Timeout** The time in seconds (1-30) before assuming that the RADIUS server did not reply and retrying a request if so configured.
9. **RADIUS Server Priority** The RADIUS server priority in relation to the alternate RADIUS server if configured. The server with the lower priority will be consulted first to authenticate a user. Servers with the same priority operate in a round-robin fashion alternating requests to each server.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device            15:52:50
------------------------RADIUS CLIENT CONFIGURATION--------------------------

1. RADIUS Client Mode         : None
2. RADIUS Server IP Address   : 0.0.0.0
   RADIUS Server Shared Secret:
   RADIUS Server Retries      : 3
   RADIUS Server Timeout      : 5
   RADIUS Server Priority     : 1
3. RADIUS Server IP Address   : 0.0.0.0
   RADIUS Server Shared Secret:
   RADIUS Server Retries      : 3
   RADIUS Server Timeout      : 5
   RADIUS Server Priority     : 1

                                Select [1-3]:
----------------------------------Messages-----------------------------------
```

Figure 3-20 RADIUS Client Configuration screen

3.7 SNTP Client Configuration

Use the SNTP Client Configuration screen to configure the 9145EMP to use a primary and secondary SNTP Server to automatically set the date and time. An accurate date and time in the 9145EMP assures accuracy for events listed in the System Log and for traps and alarms sent to the system administrator. You can choose either of two methods for setting the date and time, depending on your access to an external network and your need for accuracy.

- For accuracy within a large network, you can set up the 9145EMP to synchronize the system date and time to an SNTP server.
- The time and date can be set manually. See "Set Date and Time" on page 82 for more information.

To configure SNTP, select SNTP Client Configuration (7) from the System Configuration menu and press **Enter**. The Simple Network Time Protocol (SNTP) Client Configuration screen (Figure 3-21) opens.

On the SNTP client Configuration screen, type the number of the SNTP setting to change and then press **Enter**.

Press the Space bar to view settings, and press **Enter**.

1. **SNTP Client UTC Offset (hours)** The difference, in hours, between the local time of the 9145EMP and Coordinated Universal Time (UTC), which is similar to Greenwich Mean Time (GMT); Range is -12 to 12
2. **SNTP Client Observe DST** Enables/Disables Daylight Savings Time (Summer Time) and the date and time it starts and ends.

```
Canoga Perkins Corp.         Ethernet Network Interface Device       29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device            15:52:50
------------------------SNTP CLIENT CONFIGURATION---------------------------------
1. SNTP Client UTC Offset (hours)     : 0
2. SNTP Client Observe DST            : Disabled
   SNTP Client DST Starts At          : 01/01/2010 00:00
   SNTP Client DST Ends At            : 01/01/2010 00:01
3. SNTP Client Sync Interval (minutes): 5
4. SNTP Client Delay Time (seconds)   : 0

5. SNTP Server IP Address 1           : 0.0.0.0
   SNTP Server Retries 1              : 3
   SNTP Server Timeout 1 (seconds)    : 5
   SNTP Server Priority 1             : 1
6. SNTP Server IP Address 2           : 0.0.0.0
   SNTP Server Retries 2              : 3
   SNTP Server Timeout 2 (seconds)    : 5
   SNTP Server Priority 2             : 1

                                Select [1-6]:
-----------------------------------Messages-------------------------------------
```

Figure 3-21 SNTP Client Configuration screen

3. **SNTP Client Sync Interval (minutes)** How often, in minutes, the 9145EMP tries to synchronize its time to the SNTP server; Range is 0 (attempt to synchronize at bootup, only) to 1440 (once daily).
4. **SNTP Client Delay Time (seconds)** The delay for the initial SNTP request. If not zero, the request will be sent at a random interval within the delay time. This is used to prevent multiple NID requests at the same time in the event that all NIDs power down and power up at the same time.
5. **SNTP Server IP Address** Two SNTP servers can be configured.
   - IP Address: The address for the SNTP server. IP address 0.0.0.0 indicates no server.
   - Retries: How many times the 9145EMP tries to synchronize before trying the alternate server. Range is 0 to 10
   - Timeout (seconds): Wait period between unsuccessful attempts. Range is 1 to 30
   - Priority: The server to contact first. Range is 1 to 255 with 1 the highest priority and 255 the lowest. If the priority is the same for the two servers, the 9145EMP alternates tries between the servers.

When entries are completed, press **Esc** to return to the System Configuration menu.

3.8 SYSLOG Client Configuration

Use the SYSLOG Client Configuration screen to configure the 9145EMP to send log messages to a SYSLOG Server. From the System Configuration menu, select SYSLOG Client Configuration (8) and press **Enter**. The SYSLOG Client Configuration screen (Figure 3-22) opens.

On the SYSLOG Client Configuration screen, type the number of the SYSLOG setting to change and press **Enter**. When entries are completed, press **Esc** to return to the System Configuration menu.

Syslog Server IP Address Configure the IP address of the Syslog server. Two Syslog servers can be configured.

Syslog Server Port Configure the Syslog Server port. The standard syslog port is 514. The port setting should match with the Syslog server UDP port setting (1 - 65535).

Syslog Server Mask Define the level of severity of the messages to be sent. There are eight (8) levels of severity as defined in RFC 3164. The 9145EMP will send all messages with severity level equal to or greater than this setting. The severity levels from highest to lowest are:

- **Emergency** System is unusable.
- **Alert** Action must be taken immediately.
- **Critical** Critical Condition.
- **Error** Error Condition.
- **Warning** Warning Condition.
- **Notice** Normal but significant condition.
- **Informational** Informational messages
- **Debug** Debug level messages. If you specify Debug, then all messages about the 9145EMP are sent. If you specify Error, all errors that are Emergency, Alert, and Critical are sent.

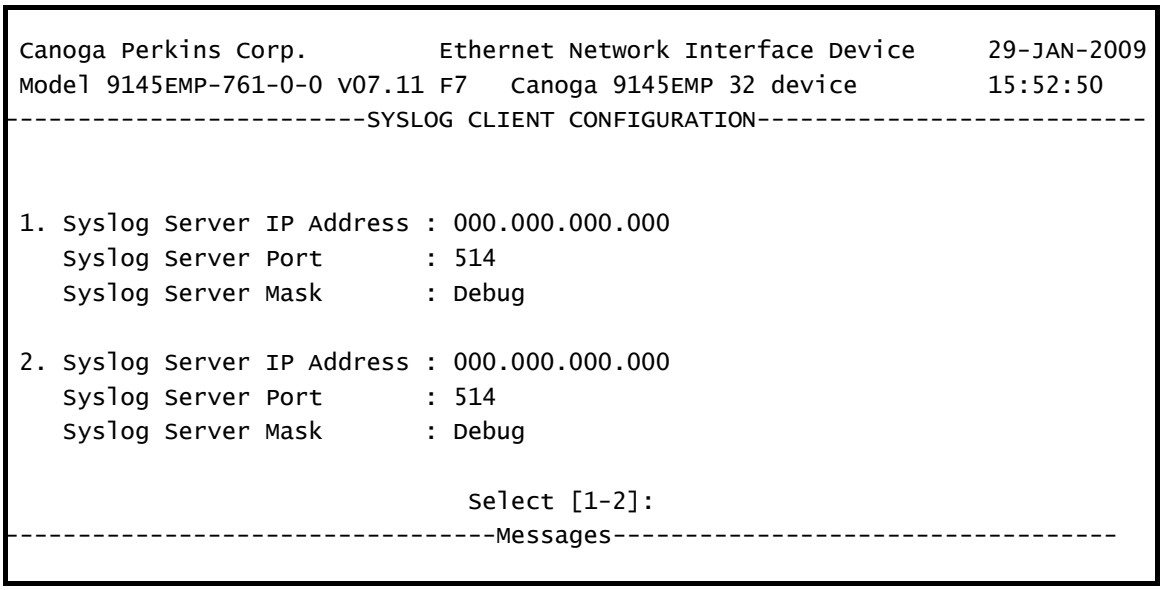
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 15:52:50
SYSLOG CLIENT CONFIGURATION
1. Syslog Server IP Address : 000.000.000.000
Syslog Server Port : 514
Syslog Server Mask : Debug
2. Syslog Server IP Address : 000.000.000.000
Syslog Server Port : 514
Syslog Server Mask : Debug
Select [1-2]:
Messages

Figure 3-22 SYSLOG Client Configuration screen

3.9 Hardware Information

The Hardware Information screen displays the model number of the 9145EMP, hardware revision level, serial number, power supplies, and port information.

From the System Configuration menu, select Hardware Information (9) and press **Enter**. The Hardware Information screen (Figure 3-23) opens.

To display User port 4, Net 1, Net 2 (Figure 3-24), type M and press **Enter**. SFPs will be detected for the network ports, even if one network port is disabled.

NOTE: Parameters and values cannot be changed in this screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     17-MAR-2010
Model 9145EMP-761-0-0 V11.15 F11   Canoga 9145EMP 32 device        08:16:02
----------------------------------HARDWARE INFORMATION---------Display 1 of 2-

NID Model Number           9145EMP-761-0-0
NID Hardware Rev.          22
NID Serial Number          20100410780


SFP Information      User Port 1        User Port 2        User Port 3
Model Number         SFP1-0045          SFP1-0045          SFP1-0045
Wavelength           850nm MM           850nm MM           850nm MM
Connector Type       Duplex LC          Duplex LC          Duplex LC
Data Rate            1000Mbps           1000Mbps           1000Mbps
Maximum Line Length  N/A                N/A                N/A
Maximum Loss Budget  7.5dB              7.5dB              7.5dB
MAC address          00:40:2A:04:E5:83  00:40:2A:04:E5:84  00:40:2A:04:E5:85

Power Supply               AC 120/240


             Select [(M)ore ], ESC to return to previous screen
----------------------------------Messages-----------------------------------
```

Figure 3-23 Hardware Information screen - 1 of 2

```
Canoga Perkins Corp.         Ethernet Network Interface Device     17-MAR-2010
Model 9145EMP-761-0-0 V11.15 F11   Canoga 9145EMP 32 device        08:19:26
---------------------------------HARDWARE INFORMATION----------Display 2 of 2-

NID Model Number          9145EMP-761-0-0
NID Hardware Rev.         22
NID Serial Number         20100410780


SFP Information      User Port 4        Network Port 1     Network Port 2
Model Number         SFP Not Present    SFP1-0045          SFP1-0045
Wavelength           N/A                850nm MM           850nm MM
Connector Type       N/A                Duplex LC          Duplex LC
Data Rate            N/A                1000Mbps           1000Mbps
Maximum Line Length  N/A                N/A                N/A
Maximum Loss Budget  N/A                7.5dB              7.5dB
MAC address          00:40:2A:04:E5:86  00:40:2A:04:E5:87  00:40:2A:04:E5:88

Power Supply              AC 120/240

---------------------------------Messages-----------------------------------
```

Figure 3-24 Hardware Information screen - 2 of 2

Chapter 4

Diagnostics

4.0 Diagnostic Functions

From the Main Menu (Figure 2-3), select (2) Diagnostics menu. The Diagnostics menu (Figure 4-1) opens. The Diagnostics functions to set up loopback, latency and jitter testing, cable diagnostics, and PING tests are configured and initiated here. The following paragraphs describe each item on the Diagnostics menu.

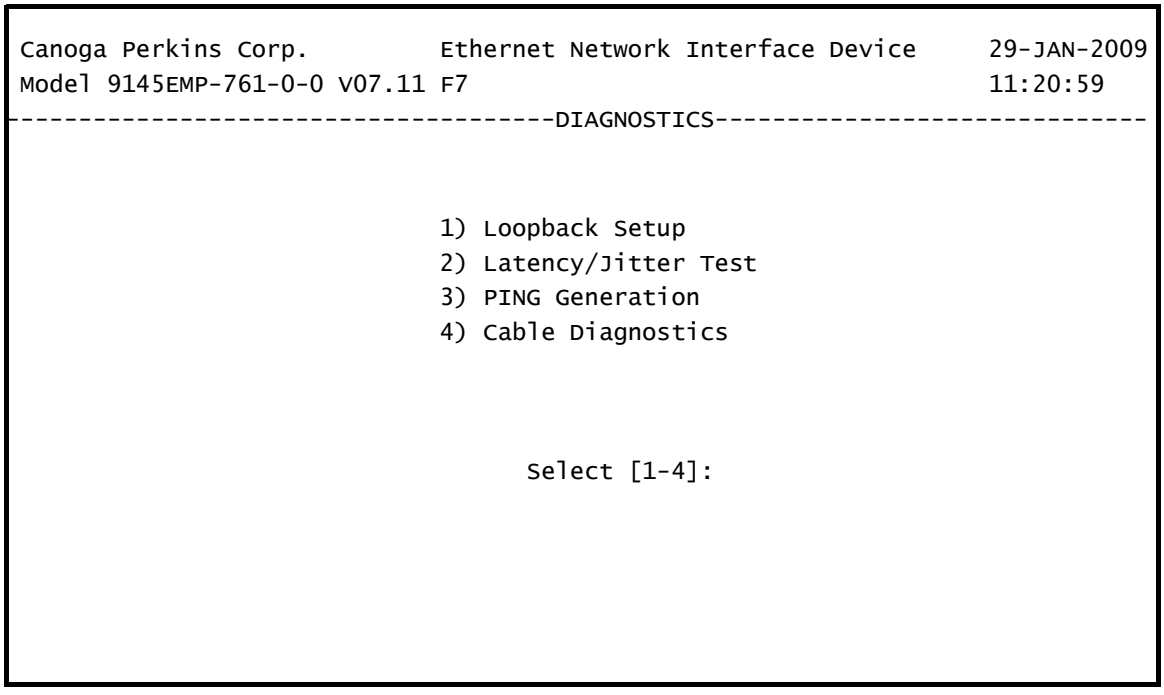

Figure 4-1 Diagnostics Menu

4.1 Loopback Setup

The Loopback Setup screen is used to configure and initiate loopback diagnostics. Packets are looped back at the User or Network port based on the Loop Test MAC address of the 9145EMP; all packets not addressed to the Loop Test MAC Address are dropped. The 9145EMP can be configured to swap origination and destination MAC addresses of the test packets and to recalculate the CRC of the looped packet when the MAC addresses are swapped, so the loopback packet can successfully navigate through the network back to the test originator.

Loopback can be enabled only on one port at a time. Loopback must be cleared before moving another port into loopback mode.

At the Diagnostics menu, type 1 and press **Enter**. The Loopback Setup screen (Figure 4-2) opens. Type the number of the function to change, and press **Enter**. Press the Space bar to select a setting and then press **Enter**. Continue to modify the settings as required. To return to the Diagnostics menu, press **Esc**.

NOTE: Do not swap the source and destination and recalculate the CRC.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7                                     11:20:59
-----------------------------------LOOPBACK SETUP-------------------------------


Loop Test MAC Address:          00 40 2A 01 EE 11


1) Loopback State               Disabled

2) Swap MAC Address
   at Loopback Point?           Yes

3) Recalculate CRC
   at Loopback Point?           Yes

                                  Select [1-3]:


-----------------------------------Messages-------------------------------------
```

Figure 4-2 Loopback Setup screen

4.2 Latency/Jitter Test

The Latency/Jitter Test screen is used to initiate tests that measure network latency, inter-frame jitter and frame loss from the local 9145EMP to a remote 9145EMP or other IP agent. At the Diagnostics menu, type 2 and press **Enter**. The Latency/Jitter Test screen (Figure 4-3) opens.

Beneath the Maximum Latency and Maximum Jitter test results are the Far End P-Bit Sent/Rcvd, Local P-Bit Sent/Rcvd, Far End DSCP Sent/Rcvd, and Local DSCP Sent/Rcvd. This data is used to determine if the programmed Packet Priority or DSCP was changed during the Round Trip between the local 9145EMP and the destination 9145EMP (far end). Only a 9145 or 9145EMP destination can provide the Far End PBit/DSCP function.

The leg of the trip (Local to Far End or Far End to Local) on which the P-Bit remarking or DSCP change is occurring will be identified. It is assumed that each Latency/Jitter test that is initiated will take a particular path, so each round trip overwrites the previous round trip values.

The following values appear at the top of the screen (Figure 4-3):

Test IP Addr/VLAN The destination IP address and VLAN for the currently test or the last test completed.

Round Trip Packets Number of completed round trips.

Test Duration The length of time the test has been running, or the length of the last test run.

Dropped Packets Number of packets sent which received no response.

Minimum Latency (ms) Time in ms for the shortest round trip.

Minimum Jitter (ms) Smallest absolute time difference between 2 round trips.

Average Latency (ms) Computed by adding all the round trip latencies and dividing by the number of completed round trips.

Average Jitter (ms) Computed by adding all the absolute time differences between successive round trips and dividing by the number of completed round trips minus 1.

Maximum Latency (ms) The highest time interval for a successful round trip.

Maximum Jitter (ms) The highest absolute time difference between 2 successful round trips.

Far End PBit Sent The programmed priority value entered.

Far End PBit Rcvd The priority as it was received at the destination 9145EMP.

Local PBit Sent The programmed priority value is put back into the packet at the far end for the return trip.

Local PBit Rcvd The priority as it was received at the end of the Round Trip.

Far End DSCP Sent This is the programmed DSCP.

Far End DSCP Rcvd The DSCP that was received at the destination 9145EMP.

Local DSCP Sent The programmed DSCP value is put back into the packet at the far end for the return trip.

Local DSCP Rcvd This is the DSCP that was received at the end of the Round Trip.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7                                     11:20:59
----------------------------------LATENCY/JITTER TEST---------------------------------
  Test IP Addr       0.0.0.0
  Test VLAN IDs C/S  0   /0               Round Trip Packets   0
  Test Duration      00:00                Dropped Packets      0
  Minimum Latency (ms)  0.000000          Minimum Jitter (ms)  0.000000
  Average Latency (ms)  0.000000          Average Jitter (ms)  0.000000
  Maximum Latency (ms)  0.000000          Maximum Jitter (ms)  0.000000
  Far End PBit Sent  0/Rcvd ?             Local PBit Sent  ?/Rcvd ?
  Far End DSCP Sent  0/Rcvd ?             Local DSCP Sent  ?/Rcvd ?

  1) To IP Addr    0.0.0.0                5) Packet Timeout sec (1-10) 3
  2) From IP Addr  Auto Selection         6) Packet Priority (0-7)     0
  3) Test C-VLAN            0             7) Packet DSCP Code (0-63)   0
  4) Test Packets per sec   1             8) Packet DF Bit             Clear
              9) Test Duration min:sec (0=forever)  0
             10) Min Test Payload Size (40 - 9950)  40
             11) Max Test Payload Size (40 - 9950)  40
             12) Start/Stop Test
                                Select [1-12]:
```

Figure 4-3 Latency/Jitter Test screen

Type the number of the function you wish to change, and press **Enter**. Once the settings have been entered, type 13 and press **Enter** to begin or end testing. Press **Esc** to return to the Diagnostics menu.

Configuration items are as follows:

1. **To IP Address** The remote agent IP Address.
2. **From IP Address** The originating IP address that the 9145EMP will place into the test packets. Press the Space bar to scroll through Auto Selection, Management IP, Test IP, and Aux IP.

   The Auto Selection setting will start first with the Test IP. If the To IP Address is in the Test Network Subnet, the Test IP will be used in the packet. If the Test IP is not available or the To IP Address is not in the Test Network Subnet, the Aux IP is checked. If the Aux IP is not available or the To IP Address is not the Aux Network Subnet, the Manager IP is

used. Any address can be used with the Manager IP since it has access to the Default Gateway.

If the From IP Address is specified as the Test IP or the Aux IP, and the To IP Address is not located in the matching subnet, the destination is unreachable. An error message is displayed when the Start Test command is given.

3. **Test C-VLAN** The test packets will carry this VLAN Tag. The Test VLAN can only be changed if the From IP Address is set to the Test IP, or the if Aux Allow Any VLAN is enabled:

NOTE: The Test C-VLAN tagging configuration (3) can only be changed based on the Source IP address configuration (2).

4. **Test Packets per sec** The number of packets that will be sent for every second the test runs. Settings are: 1, 2, 5, 10, 20, 50 or 100.

5. **Packet Timeout sec (1 - 10)** The packet timeout for this test, from 1 to 10 seconds. If a response is not received within this time limit, the packet will be considered dropped.

6. **Packet Priority** The Packet Priority Code Point (PCP) from 0 to 7, with 0 being the highest priority.

7. **Packet DSCP Code (0 - 63)** The Differentiated Services Code Point (DSCP) code used to classify packets in a Diffserv network. Other network devices that support Diffserv use the DSCP code in the IP header to select a per hop behavior (PHB) for the packet and provide the appropriate QoS treatment.

8. **Packet DF Bit** The DF (Don't Fragment) Bit is an identifier in the packet that determines if this packet can be fragmented to smaller packets.

9. **Test Duration min:sec** The amount of time the test will run in minutes and seconds. A setting of 0 will allow the test to run forever.

10. **Min Test Payload Size (40 - 9950)** The minimum test size, in bytes. The 9145EMP sends test packets ranging in size from the minimum packet setting to the maximum packet setting (sweep), if they are different. The minimum payload size must be less than, or equal to, the maximum payload size. If a sweep is being performed, the size will be incremented by 1 byte for each message sent until the maximum test payload size is reached, then decremented by 1 byte for each message sent until the minimum payload size is reached, then repeated as necessary.

11. **Max Test Payload (40 - 9950)** The maximum test payload size, in bytes. The maximum payload size must be equal to, or greater than, the minimum payload size.

NOTE: If the DF Bit is clear, the actual maximum packet size is 8192. The DF Bit must be set for oversized packets greater than 1518 (payload size greater than 1472) to be sent or the packet will be fragmented (sent as multiple packets of size 1518).

12. **Start/Stop Test** Start and Stop testing.

4.3 PING Generation

The PING Generation screen (also available from the Utility menu) is used to determine if a destination is reachable from the NID. From the Diagnostics menu, type 3 and press **Enter**. The PING Generation screen (Figure 4-4) opens.

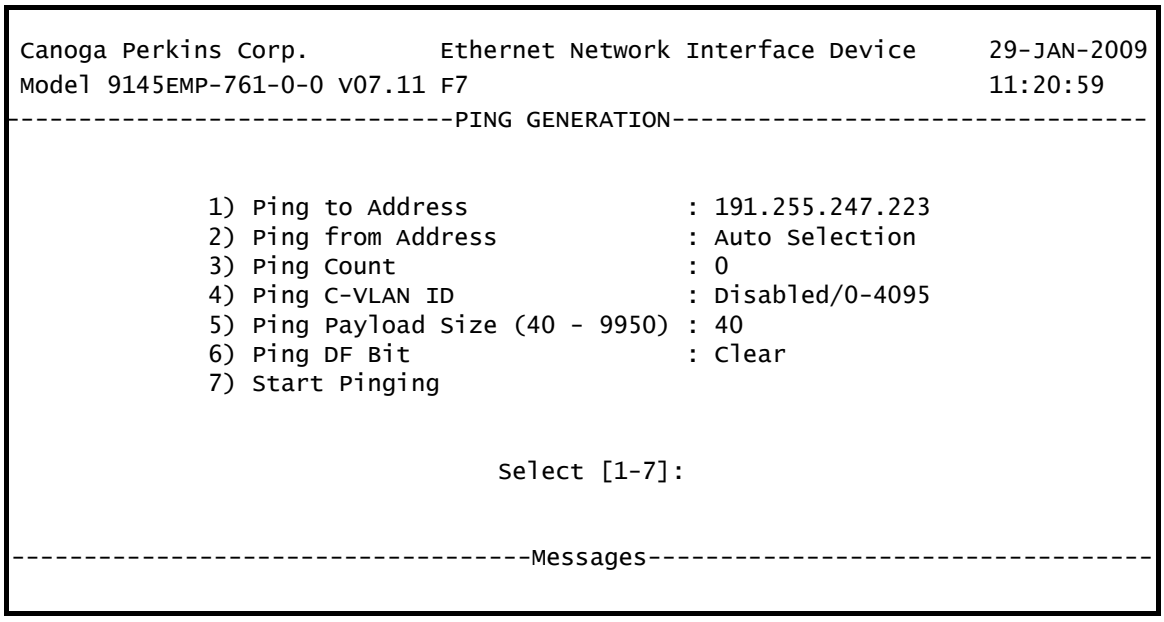
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 11:20:59
PING GENERATION
1) Ping to Address : 191.255.247.223
2) Ping from Address : Auto Selection
3) Ping Count : 0
4) Ping C-VLAN ID : Disabled/0-4095
5) Ping Payload Size (40 - 9950) : 40
6) Ping DF Bit : Clear
7) Start Pinging
Select [1-7]:
Messages

Figure 4-4 PING Generation screen

1. To enter a Ping to address, on the PING Generation screen, type 1 and press **Enter**. Type the destination IP address and press **Enter**.

2. To change the Ping from Address, type 2 and press **Enter**. Press the Space bar to select Test IP (if available), Mgr IP, Aux IP, or Auto Selection, and then press **Enter**. The Auto Selection setting will start first with the Test IP.

   If the Ping to Address is in the Test Network Subnet, the Test IP will be used in the ping packet. If the Test IP is not available or the Ping to Address is not in the Test Network Subnet, the Aux IP is checked. If the Aux IP is not available or the Ping to Address is not the Aux Network Subnet, the Manager IP is used. Any address can be used with the Manager IP since it has access to the Default Gateway.

   If the Ping from Address is specified as the Test IP or the Aux IP, and the Ping to Address is not located in the matching subnet, the destination is unreachable. An error message is displayed when the Start Pinging command is given.

3. To enter a Ping Count, type 3 and press **Enter**. Type a value from 1 to 255 (0 = forever). and press **Enter**.

4. To enter the Ping C-VLAN ID, type 4 and press **Enter**. The VLAN ID is only writable if the Ping from Address is the Test IP, or the Aux IP if Aux Allow Any VLAN is enabled.

NOTE: Ping C-VLAN ID can be changed only if the source IP address (2) is the Test IP address.

5. To enter the Ping Payload Size, type 5 and press **Enter**. Type a value between 40 and 9950. To send packets greater than 1518 (payload size greater than 1472), the DF (Don't Fragment) bit must be set or the packet will be fragmented (sent as multiple packets of size 1518).

6. To change the Ping DF Bit setting, type 6 and press **Enter**. See the Ping Payload size for explanation.

7. When you are finished entering values, type 7 to start pinging and press **Enter**. The PING test starts (Figure 4-5).

8. When the test is complete, press **Esc** to return to the PING Generation screen.

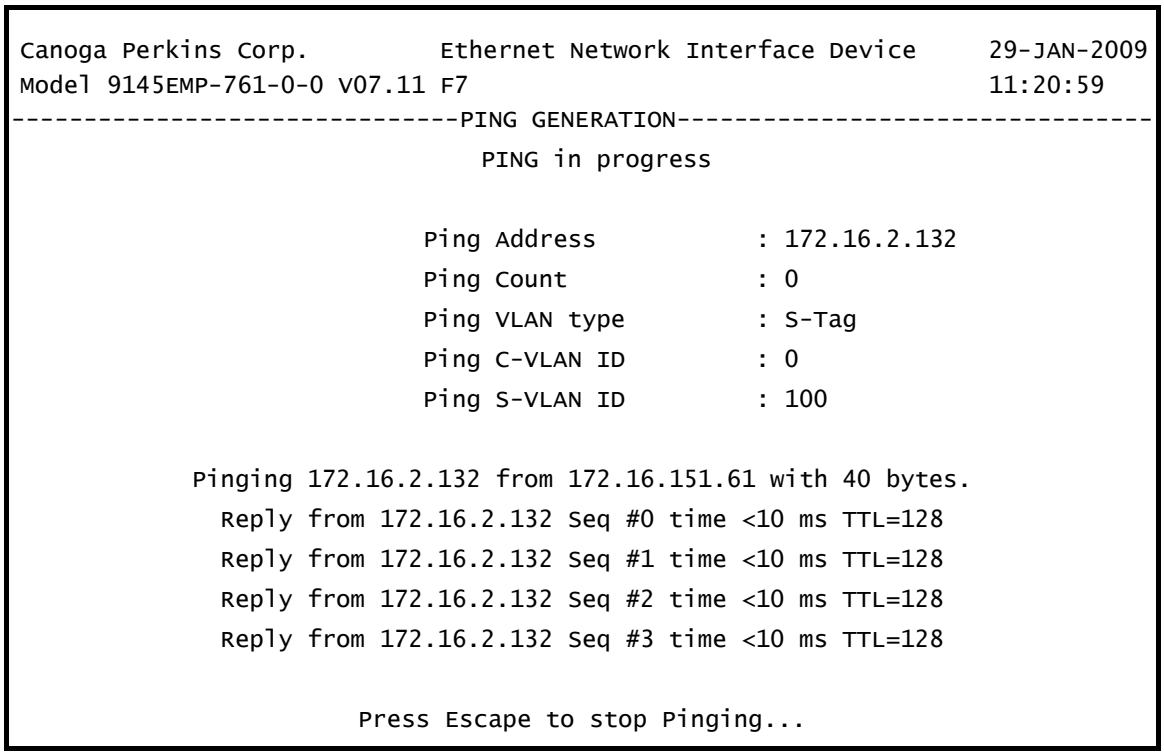
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 11:20:59
PING GENERATION
PING in progress
Ping Address : 172.16.2.132
Ping Count : 0
Ping VLAN type : S-Tag
Ping C-VLAN ID : 0
Ping S-VLAN ID : 100
Pinging 172.16.2.132 from 172.16.151.61 with 40 bytes.
Reply from 172.16.2.132 Seq #0 time <10 ms TTL=128
Reply from 172.16.2.132 Seq #1 time <10 ms TTL=128
Reply from 172.16.2.132 Seq #2 time <10 ms TTL=128
Reply from 172.16.2.132 Seq #3 time <10 ms TTL=128
Press Escape to stop Pinging...

Figure 4-5 PING Generation - In Progress screen

4.4 Cable Diagnostics

The cable diagnostics function provides UTP cable testing. Its function is to determine the UTP cable status and can provide a very useful physical link troubleshooting tool.

- When the cable is OK, cable diagnostics indicates the length of the cable.
- When there is a problem, cable diagnostics indicates how far from the interface connection the fault is and information about the fault.

To access the Cable Diagnostics screen, from the Diagnostics menu, type 4 and press **Enter**. The Cable Diagnostics screen (Figure 4-6) opens.

> ***NOTE:*** The cable diagnostic test is for User ports only, as the network ports are SFP.

To run the diagnostics test on the User port, type the number of the port (1-4) and press **Enter**. When the test is complete, press **Esc** to return to the Diagnostics menu.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7                                    11:20:59
-----------------------------------CABLE DIAGNOSTICS---------------------------

  1) User Port 1
  2) User Port 2
  3) User Port 3
  4) User Port 4

                                 Select[1-4]:

   Interface:                USR3

   Pair 1 State:             Open
   Pair 2 State:             Open
   Pair 3 State:             Open
   Pair 4 State:             Open
   Pair 1 Length:            0.00 <m> +/- 5 <m>
   Pair 2 Length:            0.00 <m> +/- 5 <m>
   Pair 3 Length:            0.00 <m> +/- 5 <m>
   Pair 4 Length:            0.00 <m> +/- 5 <m>

-----------------------------------Messages-----------------------------------
```

Figure 4-6 Cable Diagnostics screen

Chapter 5

Port Information

5.0 Port Description

The Port Information screen (Figure 5-1) provides a description and a graphic depiction of the User, Network, Multipurpose and Management ports for the 9145EMP, with options to view parameters and statistics for specific ports. Configuration information includes the model number, description, and revision, as well as the serial number; and link, remote fault, and physical status and settings.

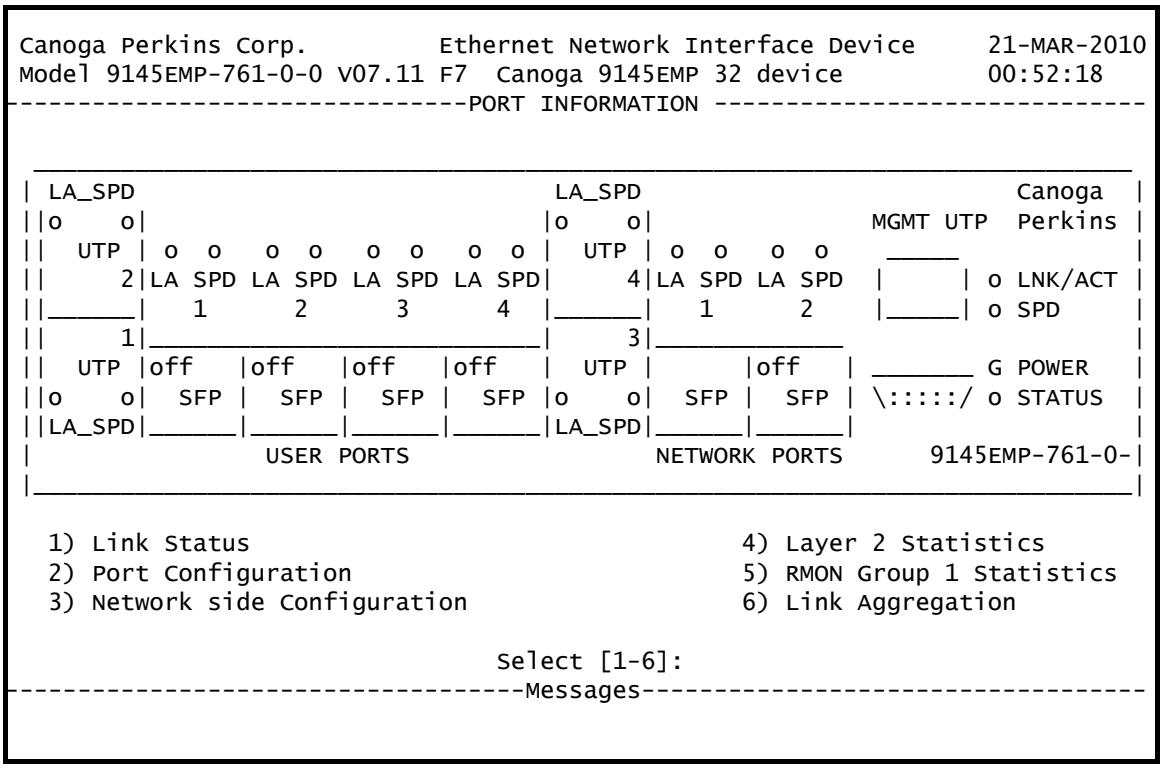

Figure 5-1 Port Information screen

5.1 Link Status

Link Status informs you of the current link status of the User, Network, and Management UTP ports of the 9145EMP and provides information on User and Network Port SFP transmit (Tx) and receive (Rx) power.

From the Port Information screen (Figure 5-1), select Link Status (1) and press **Enter.** The Link Status screen (Figure 5-2) opens.

Press **Esc** to return to the Port Information screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           01:11:25
---------------------------------LINK STATUS-----------------------------------

User Port 1            Link Down        Network Port 1    Link Down
User Port 2            Link Down        Network Port 2    Link Down
User Port 3            Link Down
User Port 4            Link Down

MGMT UTP Port          Link Up

SFP Status:
   User SFP 1 Rx Power  No Power  Network SFP 1 Rx Power     No Power
   User SFP 1 Tx Power  No Power  Network SFP 1 Tx Power     -6.0dBm
   User SFP 2 Rx Power  No Power  Network SFP 2 Rx Power     No Power
   User SFP 2 Tx Power  No Power  Network SFP 2 Tx Power     -6.3dBm
   User SFP 3 Rx Power  No Power
   User SFP 3 Tx Power  No Power
   User SFP 4 Rx Power  No Power
   User SFP 4 Tx Power  No Power

                           Press ESC to go back
-----------------------------------Messages-----------------------------------
```

Figure 5-2 Link Status screen

5.2 Port Configuration

Use the Port Configuration functions to obtain hardware information, or to view and modify the functional configuration and manage the various port filters.

At the Port Information screen (Figure 5-1), select Port Configuration (2) and press **Enter.** The Port Configuration screen opens. The following sections describe the items on the Port Configuration menu. Press **Esc** to return to the Port Information screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           10:14:38
-------------------------------PORT CONFIGURATION-------------------------------


                            1) Hardware Information
                            2) Functional Configuration
                            3) Port Filters



                              Select [1-3]:


-----------------------------------Messages-----------------------------------
```

Figure 5-3 Port Configuration screen

5.2.1 Hardware Information

The Hardware Information screen (Figure 5-4) provides 9145EMP hardware information such as model number, hardware revision, and serial number for the 9145EMP.

To review hardware information, select Hardware Information (1) from the Port Configuration menu and press **Enter**. This is an informational screen only.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:02:33
-----------------------------------HARDWARE INFORMATION-----------------------

NID Model Number           9145EMP-761-0-0
NID Hardware Rev.          22
NID Serial Number          20100410780


SFP Information      User Port 4        Network Port 1     Network Port 2
Model Number         SFP Not Present    SFP1-0045          SFP1-0045
Wavelength           N/A                850nm MM           850nm MM
Connector Type       N/A                Duplex LC          Duplex LC
Data Rate            N/A                1000Mbps           1000Mbps
Maximum Line Length  N/A                N/A                N/A
Maximum Loss Budget  N/A                7.5dB              7.5dB
MAC address          00:40:2A:04:E5:86  00:40:2A:04:E5:87  00:40:2A:04:E5:88

Power Supply               AC 120/240


             Select [(M)ore ], ESC to return to previous screen
-----------------------------------Messages-----------------------------------
```

Figure 5-4 Hardware Information Menu

5.2.2 Functional Configuration

From the Port Configuration screen (Figure 5-3), select the Functional Configuration (2) and press **Enter**. The Functional Configuration screen (Figure 5-5) opens.

The Functional Configuration screen displays the User and Network port speed and duplex information, and allows you to set the functions listed below. To modify the settings, type the number of the setting and press **Enter**.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     23-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:04:20
-------------------------------FUNCTIONAL CONFIGURATION-----------------------

User Port 1 Speed/Duplex   Link Down   Net Port 1 Speed/Duplex     Link Down
User Port 2 Speed/Duplex   Link Down   Net Port 2 Speed/Duplex     Link Down
User Port 3 Speed/Duplex   Link Down
User Port 4 Speed/Duplex   Link Down   MGMT UTP Port Speed/Duplex  10M/Full

 1) User Port 1 Connector  UTP     2) User Port 1 Setting  10/100/1000M Auto
 3) User Port 2 Connector  UTP     4) User Port 2 Setting  10/100/1000M Auto
 5) User Port 3 Connector  UTP     6) User Port 3 Setting  10/100/1000M Auto
 7) User Port 4 Connector  UTP     8) User Port 4 Setting  10/100/1000M Auto
 9) Net Port 1 Setting     1000M Auto
10) Net Port 2 Setting     1000M Full
11) Flow Control           Disabled
12) Maximum Frame Size     10000

                                Select [1-12]:
-----------------------------------Messages-------------------------------------
```

Figure 5-5 Functional Configuration screen

You can modify the following settings:

User Port Connectors (for ports 1-4) Controls whether the User Port UTP or SFP connector is active, regardless of what is physically connected. The SPD LED will blink once a second over the active connector if it is empty. Press the Space bar to move between the SFP and UTP connector.

User Port Settings (for ports 1-4) Sets the speed/duplex for each User Port and allows the port to be disabled.

- If UTP is selected as the connector, press the Space bar to select a setting.
- If SFP is selected as the connector, the speed setting is defined by the SFP. Press the Space bar to move between the available options.

The settings are listed below:

User UTP Port Settings	User and Network Port SFP Settings
Disabled 10M Half 10M Full 10M Auto 100M Half 100M Full 100M Auto 10/100M Auto 1000M Full 10/100/1000M Auto	Disabled 100M Half 100M Full 1000M Full 1000M Auto

Net Port Settings (for ports 1-2) Sets the duplex for the Network Port and allows the port to be disabled. The speed setting is defined by the SFP that has been inserted. Press the Space bar to move between the available options.

NOTE: For dual rate SFPs the speed must be configured. Configurable rates are 100M Half, 100M Full, 1000M Full, and 1000M Auto***.***

Flow Control (11) Enables or disables flow control on the ports. Flow control is used for 9145EMPs that have a speed mismatch between the user port and the network port and are attached to equipment that can buffer overflow traffic. If Flow Control is enabled, the 9145EMP will begin to transmit PAUSE frames when its buffers are half full. Press the Space bar to select User Ports Enabled, Net Ports Enabled, All Ports Enabled, or Disabled.

Maximum Frame Size (12) Sets the maximum allowable Ethernet Frame size that the 9145EMP will forward for all ports. Frames exceeding the Maximum Frame Size will be counted as Oversize Packets and will be discarded. Frames destined for the 9145EMP Manager are exempt from the limit. Enter a Maximum Frame Size between 1518 and 10000. Note that an S-tag is added to frames ingress to the user port, so the maximum size of frames ingress to the user port is 9996 since anything over 10000 is not transmitted.

5.2.3 Port Filters

Use Port Filters to set filters on the User and Network ports to filter certain management and control Ethernet frames from the data stream and control traffic coming in or out of specific ports.

To configure the port filters, select Port Filters (4) from the Port Configuration screen and press **Enter**. The Port Filters screen (Figure 5-6) opens. To set the port filters, type the filter item number (1 to 6), and press **Enter**.

1. **PVST + BPDU Filter** When this attribute is enabled, the 9145EMP will discard PVST + BPDU frames received on the specified port. Press the Space bar to select Disabled, User Ports Enabled, Net Ports Enabled, or All User and Net Ports Enabled.
2. **User Side Manager MAC Filter** When this attribute is enabled, the 9145E will block packets entering the unit which have the unit's MAC address as the source MAC Address. This prevents spoofing of Management frames. Press the Space bar to select Enabled or Disabled.

3. **User Side Test Network Filter** When this attribute is enabled, the 9145EMP will inspect and discard all packets entering its User port that have a source IP address on the same subnet mask as the Test network. This prevents spoofing of test packets. Press the Space bar to select Enabled or Disabled.
4. **Link OAM PDU Filter** When this attribute is enabled, the 9145EMP will block Link OAM PDU frames from being generated from or passed through the unit. Press the Space bar to select Enabled or Disabled.
5. **UDLD Filter** When this attribute is enabled, the 9145EMP will block Cisco Systems proprietary tagged and untagged UDLD frames from passing through the unit. Press the Space bar to select Enabled or Disabled.
6. **Management VLAN Filter** When this attribute is enabled, the 9145EMP will block traffic that is tagged with the Management VLAN on the specified port. This will not affect management packets that are addressed to the 9145EMP. Press the Space bar to select Disabled, User Ports Enabled, Net Ports Enabled, or All User and Net Ports Enabled.

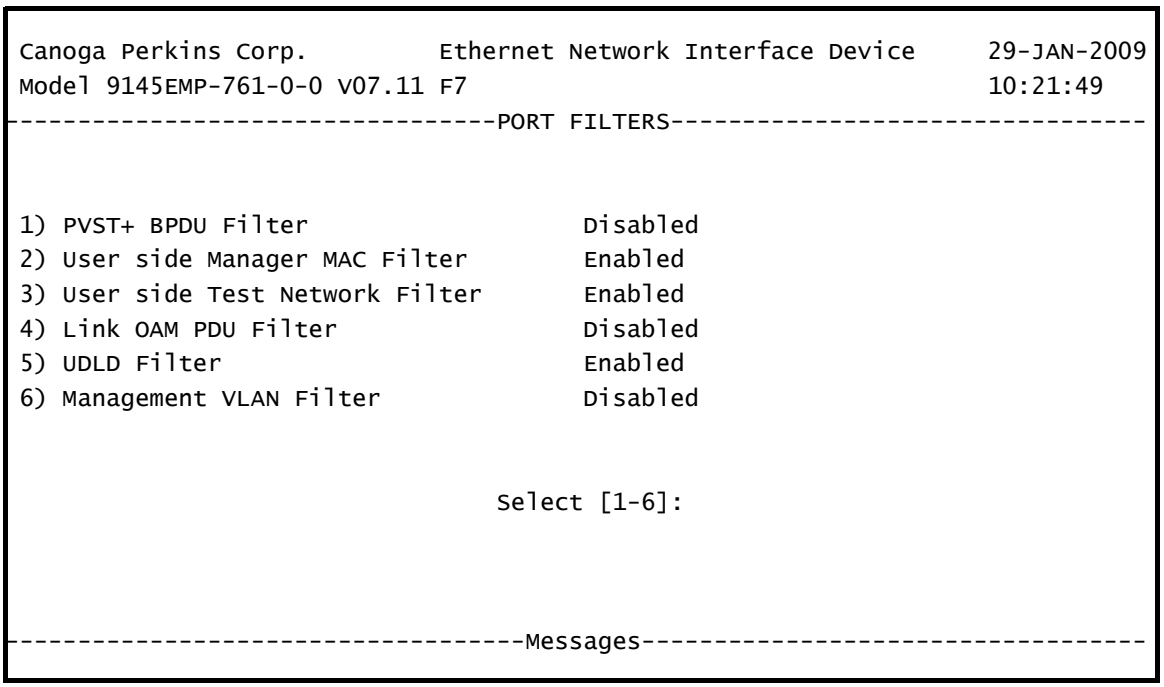
Canoga Perkins Corp. Ethernet Network Interface Device 29-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 10:21:49
PORT FILTERS
1) PVST+ BPDU Filter Disabled
2) User side Manager MAC Filter Enabled
3) User side Test Network Filter Enabled
4) Link OAM PDU Filter Disabled
5) UDLD Filter Enabled
6) Management VLAN Filter Disabled
Select [1-6]:
Messages

Figure 5-6 Port Filters screen

5.3 Network-side Configuration

From the Port Information screen (Figure 5-1), select Network Side Configuration (3) and press **Enter**. The Network Side Forwarding Configuration screen (Figure 5-7) opens.

NOTE: If you are unable to change the active network interface, ensure that you do not have VLAN MUX records, a SOAM entity attached, or Link OAM enabled.

1. Press **Enter** to highlight the Active network Interface.
2. Press the Space bar to change the setting: Net1, Net2, or LAG. When you are finished, press **Enter**.
3. Press **Esc** to return to the Port Information screen.

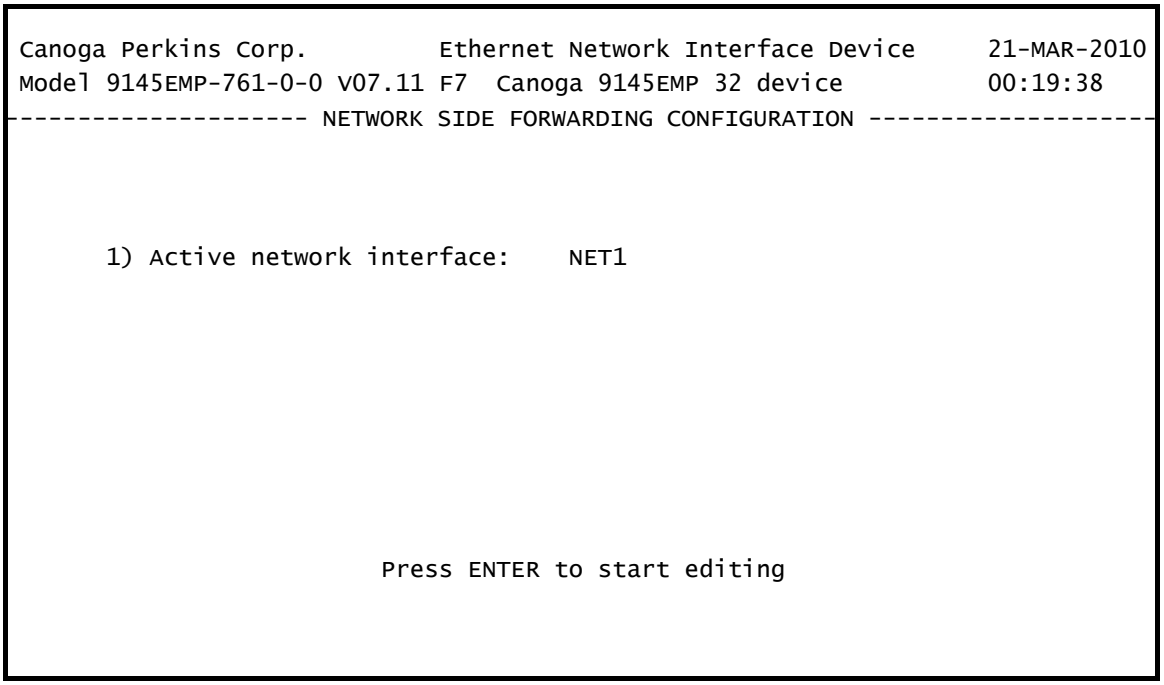
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:19:38
NETWORK SIDE FORWARDING CONFIGURATION
1) Active network interface: NET1
Press ENTER to start editing

Figure 5-7 Network Side Forwarding Configuration screen

5.4 Layer 2 Statistics

To view Layer 2 statistics, from the Port Information screen (Figure 5-1), select Layer 2 Statistics (4) and press **Enter**. The Layer 2 Statistics screen (Figure 5-8) opens.

Use the controls as listed at the bottom of the screen to view the Layer 2 Statistics screen. Press **Esc** to return to the Port Information screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     15-JUN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:23:42
-------------------------LAYER 2 STATISTICS (CURRENT)-------------------------

                        User Port 1     User Port 2     User Port 3
Link State             ** DOWN **      ** DOWN **      ** DOWN **
Speed/Duplex               N/A             N/A             N/A

Frames Sent                   0               0               0
Frames Rcvd                   0               0               0
Bytes Sent                    0               0               0
Bytes Rcvd                    0               0               0
Frames > 1518                 0               0               0
Frames > 1522                 0               0               0
Line Rate Utilization         0%              0%              0%

Last Counter Reset: 18:34:18

 Select [(P) More ports, (C) Change Counter Frame Size, (E) Error Counters,
 (T) Frame Type Counters, (CTRL-T) Raw Counters, (CTRL-R) Reset Counters]:

-----------------------------------Messages-----------------------------------
```

Figure 5-8 Layer 2 Statistics screen

You can perform the following actions on this screen:

Change Counter Frame Size The 9145EMP has a programmable counter for frames greater than the programmed size. Type C and press **Enter**. Type the frame size, between 64 and 10,000, and press **Enter**.

Error Counters Type E and press **Enter** to view the Layer 2 Error Statistics screen (Figure 5-9).

Frame Type Counters Type T and press **Enter** to view the Layer 2 Frame Type Statistics screen (Figure 5-10).

Raw Counters Press **CTRL-T** to view raw layer 2 statistics. These are the total counters since the last time the 9145EMP was reset.

Reset Counters Press **CTRL-R** to reset the counters. The counters are reset independently of the raw counters. The raw counters can not be cleared.

Frame Counters Type F (available on Layer 2 Error Statistics and Layer 2 Frame Type Statistics menus) to return to the Layer 2 Statistics screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:29:29
----------------------LAYER 2 ERROR STATISTICS (CURRENT)-----------------------

                        User Port 1     User Port 2     User Port 3
Link State             ** DOWN **      ** DOWN **      ** DOWN **
Frames Sent                   0               0               0
Frames Rcvd                   0               0               0
Collisions                    0               0               0
Late Collisions               0               0               0
Alignment Errors              0               0               0
Undersize < 64                0               0               0
Oversize > 10000              0               0               0
Fragments                     0               0               0
CRC Errors                    0               0               0
Jabber Events                 0               0               0
Dropped                       0               0               0

Last Counter Reset: 3 days 04:15:53

    Select [(P) More ports, (F) Frame Counters, (T) Frame Type Counters,
              (CTRL-T) Raw Counters, (CTRL-R) Reset Counters]:
```

Figure 5-9 Layer 2 Error Statistics screen

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:27:12
-------------------LAYER 2 FRAME TYPE STATISTICS (CURRENT)---------------------

                        User Port 1     User Port 2     User Port 3
Link State             ** DOWN **      ** DOWN **      ** DOWN **
Frames Sent                   0               0               0
Frames Rcvd                   0               0               0
Rx Broadcasts                 0               0               0
Tx Broadcasts                 0               0               0
Rx Multicasts                 0               0               0
Tx Multicasts                 0               0               0
VLAN Tagged                   0               0               0
Pause Frames                  0               0               0
Filtered Frames               0               0               0
Rx Management                 0               0               0
Tx Management                 0               0               0

Last Counter Reset: 3 days 04:13:38

         Select [(P) More ports, (F) Frame Counters, (E) Error Counters,
              (CTRL-T) Raw Counters, (CTRL-R) Reset Counters]:
```

Figure 5-10 Layer 2 Frame Type Statistics screen

5.4.1 Layer 2 Counter Definitions

The following are definitions of the counters displayed on the Layer 2 Statistics screen (Figure 5-8), the Layer 2 Error Statistics screen (Figure 5-9) and Layer 2 Frame Type Statistics screens (Figure 5-10).

5.4.1.1 Layer 2 Statistics

These counters are shown in Figure 5-8.

Frames Sent The total number of frames sent from the interface since the last reset (Raw) or the last counter reset (Current).

Frames Rcvd The total number of valid frames received on the interface since the last reset (Raw) or the last counter reset (Current).

Bytes Sent The total number of bytes transmitted from the interface since the last reset (Raw) or the last counter reset (Current).

Bytes Rcvd The total number of valid bytes received on the interface since the last reset (Raw) or the last counter reset (Current).

Frames > 1518 The number of frames received on the interface that had a length (excluding framing bits, but including the CRC) of 1519 or higher.

Frames > Limit The number of frames received on the interface that had a length that exceeded the user-defined Frame Size.

Line Rate Utilization The percent utilization of the Ethernet segment on a scale of 0 to 100 percent.

5.4.1.2 Layer 2 Error Statistics Screen

These counters are shown in Figure 5-9

Frames Sent The total number of frames sent from the interface since the last reset (Raw) or the last counter reset (Current).

Frames Rcvd The total number of valid frames received on the interface since the last reset (Raw) or the last counter reset (Current).

Collisions The number of collisions that the interface encountered when attempting to transmit a frame over a half duplex connection.

Late Collisions The number of collisions that the interface encountered later than 512 bit-times into the frame when attempting to transmit a frame over a half duplex connection.

Alignment Errors The number of frames received on the interface that had a non-integral number of octets and a bad CRC. The interface will discard the frame.

Undersize < 64 The number of frames received on the interface that were less than 64 bytes in length (excluding framing bits, but including the CRC), and were otherwise well formed. The interface will discard the frame.

Oversize > MaxFrameSize The number of frames received on the interface that had a length (excluding framing bits, but including the CRC) greater than the Maximum Frame Size set for the unit, inclusive.

See the Functional Configuration screen for information on how to set the Maximum Frame Size. The interface will discard the frame.

Fragments The number of frames received on the interface that were not an integral number of bytes in length or that had a bad CRC, and were less than 64 bytes in length (excluding framing bits but including the CRC). The interface will discard the frame.

CRC Errors The number of frames received on the interface that had a length (excluding framing bits, but including the CRC) of between 64 and the Maximum Frame Size, inclusive, but had a bad CRC. The interface will discard the frame.

Jabber Events The number of frames received on the interface that had a length greater than 1518 and had a bad CRC. This follows the definition in the RMON RFC.

Dropped The number of frames that the interface was unable to transmit due to buffer overflow or link failure.

5.4.1.3 Layer 2 Frame Type Statistics

These counters are shown in Figure 5-10.

Frames Sent The total number of frames sent from the interface since the last reset (Raw) or the last counter reset (Current).

Frames Rcvd The total number of valid frames received on the interface since the last reset (Raw) or the last counter reset (Current).

Rx Broadcasts The number of broadcast frames received on the interface.

Tx Broadcasts The number of broadcast frames transmitted by the interface.

Rx Multicasts The number of multicast frames received on the interface.

Tx Multicasts The number of multicast frames transmitted by the interface.

VLAN Tagged The number of VLAN tagged frames received on the interface.

Pause Frames The number of PAUSE frames received by the interface.

Filtered Frames The number of frames received on the interface that were dropped due to filtering rules.

Rx Management The number of frames received on the interface that were passed to the 9145EMP manager.

Tx Management The number of frames received from the 9145EMP manager that were passed to the interface.

5.5 RMON Group 1 Statistics

To view Remote Monitoring Specification (RMON) statistics, from the Port Information screen (Figure 5-1), select RMON Group 1 Statistics (5) and press **Enter**. The RMON Group 1 Statistics screen (Figure 5-11) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:45:03
----------------------RMON GROUP 1 STATISTICS (CURRENT)-----------------------

                        User Port 1     User Port 2     User Port 3
Link State             ** DOWN **      ** DOWN **      ** DOWN **
Speed/Duplex               N/A             N/A             N/A

Packets Rcvd                  0               0               0
Octets Rcvd                   0               0               0
Broadcasts Rcvd               0               0               0
Multicasts Rcvd               0               0               0
Pkts 64                       0               0               0
Pkts 65-127                   0               0               0
Pkts 128-255                  0               0               0
Pkts 256-511                  0               0               0
Pkts 512-1023                 0               0               0
Pkts 1024-1518                0               0               0

Last Counter Reset: 23:14:27

Select [(P) Ports, (M) More, (CTRL-T) Raw Counters, (CTRL-R) Reset Counters]:
-----------------------------------Messages-----------------------------------
```

Figure 5-11 RMON Group 1 Statistics screen

Follow the instructions at the bottom of the RMON Group 1 Statistics screen to view the information listed below. Type P to view other ports. Type M to view more statistics. Press **Esc** to return to the Port Information screen.

The following counters are displayed on the RMON Group 1 Statistics screen:

Packets Rcvd Reports the total number of packets (including bad packets, broadcast packets, and multicast packets) received.

Octets Rcvd Reports the total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).

Broadcasts Rcvd Reports the total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Multicasts Rcvd Reports the total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.

Pkts 64 Reports the total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).

Pkts 65-127 Reports the total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).

Pkts 128-255 Reports the total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).

Pkts 256-511 Reports the total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

Pkts 512-1023 Reports the total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Pkts 1024-1518 Reports the total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Type M and press **Enter** to see more statistics (Figure 5-12):

Drop Events Reports the total number of events in which packets were dropped by the probe due to lack of resources. Note that this number is not necessarily the number of packets dropped; it is just the number of times this condition has been detected.

CRC/Align Errors Reports the total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

Undersize Reports the total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.

Oversize Reports the total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.

Fragments Reports the total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

Note that it is entirely normal for Fragments to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits.

Jabbers Reports the total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). The allowed range to detect jabber is between 20 ms and 150 ms.

Collisions Reports the best estimate of the total number of collisions on this Ethernet segment.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:49:34
----------------------RMON GROUP 1 STATISTICS (CURRENT)-------------------------

                        User Port 1     User Port 2     User Port 3
Link State             ** DOWN **      ** DOWN **      ** DOWN **
Speed/Duplex               N/A             N/A             N/A

Packets Rcvd                  0               0               0
Octets Rcvd                   0               0               0
Drop Events                   0               0               0
CRC/Align Errors              0               0               0
Undersize                     0               0               0
Oversize                      0               0               0
Fragments                     0               0               0
Jabbers                       0               0               0
Collisions                    0               0               0


Last Counter Reset: 23:18:57

Select [(P) Ports, (M) More, (CTRL-T) Raw Counters, (CTRL-R) Reset Counters]:

---------------------------------Messages---------------------------------------
```

Figure 5-12 RMON Group 1 Statistics screen (continued)

5.6 Link Aggregation

The 9145EMP supports Link Aggregation (LAG) as a link protection mechanism on Network ports. Only one LAG group is configured in the system, labeled LAG 1. Only Network ports can be assigned to the LAG. Moreover, if the LAG mode is enabled on the network side, then traffic cannot be sent on individual Network ports.

To configure LAG or view LAG Statistics, from the Port Information screen (Figure 5-1), select Link Aggregation (6) and press **Enter**. The Link Aggregation Main Menu (Figure 5-13) opens.

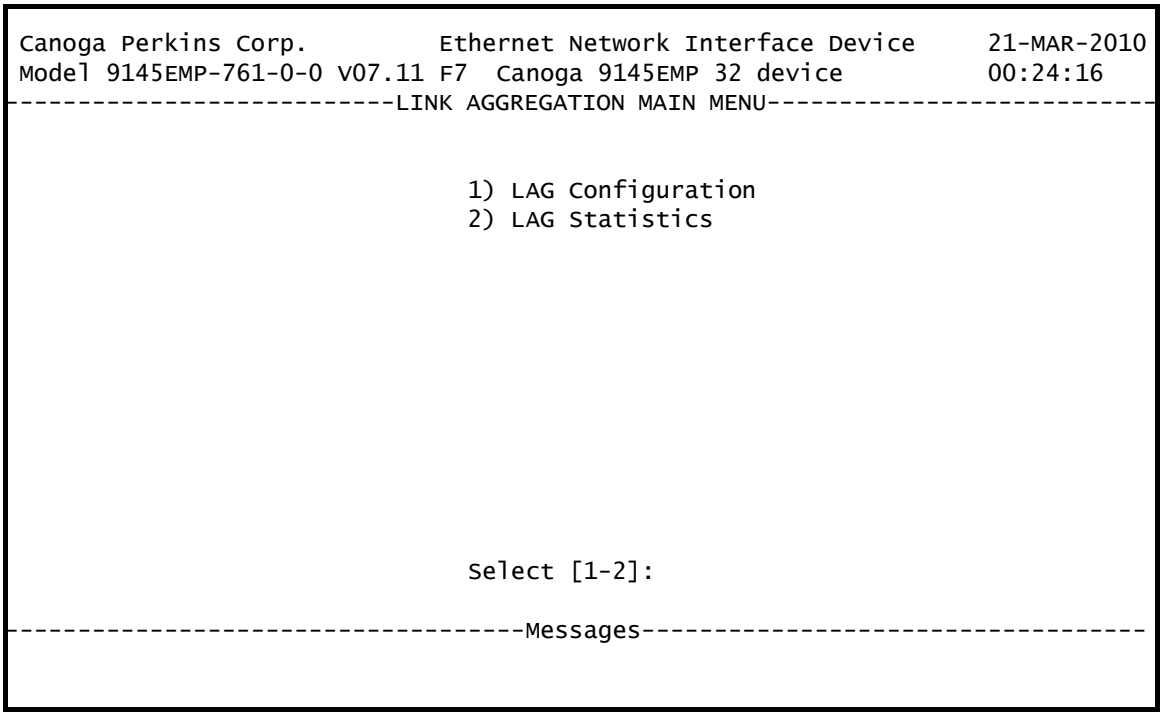
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:24:16
LINK AGGREGATION MAIN MENU
1) LAG Configuration
2) LAG Statistics
Select [1-2]:
Messages

Figure 5-13 Link Aggregation Main Menu

5.6.1 LAG Configuration

To configure LAG, from the Link Aggregation Main Menu (Figure 5-13) type 1 and press **Enter**. The LAG Configuration screen (Figure 5-14) opens. You can configure aggregation ports and the aggregation group.

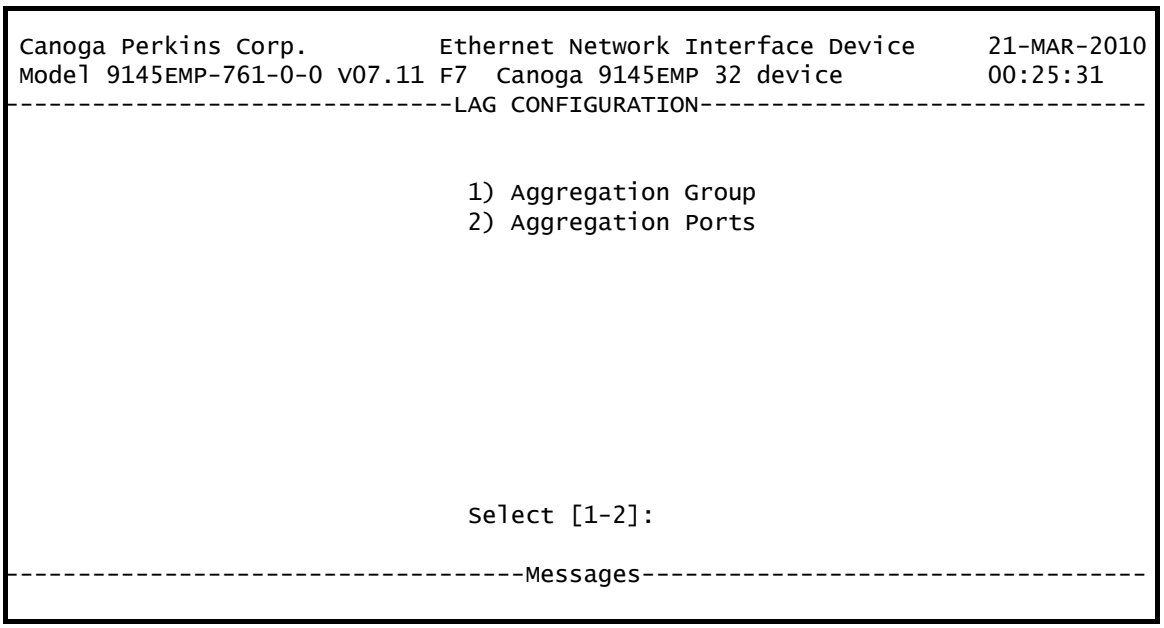
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:25:31
LAG CONFIGURATION
1) Aggregation Group
2) Aggregation Ports
Select [1-2]:
Messages

Figure 5-14 LAG Configuration screen

5.6.1.1 Aggregation Group

To configure an aggregation group, from the LAG Configuration screen (Figure 5-14), type 1 and press **Enter**. The LAG Aggregation Group Attributes screen (Figure 5-15) opens.

To configure, type the number of the attribute and press **Enter**. When you are finished configuring, type A to accept and then press **Esc** to return to the LAG Configuration screen.

The aggregation group attributes are:

Admin status Enables or disables the Link Aggregation Group. The group must be enabled in order to transmit and receive traffic.

Priority A numerical value attached to the System MAC address in order to create a unique System ID. Enter a number in the range 1 - 65535.

Actor admin key Administrative key of the group (or port) used for dynamic port to aggregator mapping. Enter a number in the range 1 - 65535. In the group screen, this is the group admin key; in the port screen, it is the port admin key.

Distribution algorithm specifies the mechanism to send frames on one port or another, on the network side. Supported mechanisms are:

- **MAC/XOR** Determines the destination port for each frame based on XOR-ing the source and destination MAC address of the frame.
- **active/standby** An active/standby algorithm, in which traffic will be sent on one port only, even if the other port in the LAG is active. (As the distribution algorithm is not negotiated

with the far end, but has only a local significance, the receive direction is enabled on this standby port.) If the active port fails, the standby port takes over. The protocol is not revertive.

- **Vlan-xor** VLAN-based XOR distribution (similar to MAC/XOR, but using the outer VLAN field as a reference. Untagged frames are distributed based on the value on the 14th and 15th byte of data.
- **Vlan-ip-xor** VLAN, IP Src, and IP Dest based distribution (similar to MAC/XOR, but using VLAN, IP source, and IP destination fields as reference).

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           00:54:17
----------------------LAG AGGREGATION GROUP ATTRIBUTES-------------------------

 Index:                      1
 Ports:                      NET1           Operational State:     Down
 System MAC Address:         00:40:2A:04:E5:87
 Partner Sys. Address:       00:40:2A:04:E5:47
 Actor Oper. Key:            32769          Partner Oper. Key:     32769
 Link Up/Down Notification: Disabled        Partner Sys. Priority: 33024

 1) Admin status:            Enabled
 2) Priority:                33024
 3) Actor admin key:         1
 4) Distribution algorithm: MAC XOR




                         Select [1-4] for attributes:

-----------------------------------Messages---------------------------------
```

Figure 5-15 LAG Aggregation Group Attributes screen

5.6.1.2 LAG Aggregation Ports

To configure aggregation ports, from the LAG Configuration screen (Figure 5-14), type 2 and press **Enter**. The LAG Ports List (Figure 5-16) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:18:33
--------------------------------LAG PORTS LIST---------------Display 1 - 2 of 2-

 INTERFACE     ADMIN STATUS   AGGREGATION STATUS       OPERATIONAL STATUS

 NET1          Disabled       Not assigned             Down
 NET2          Disabled       Not assigned             Down









                    Select (E)dit, (D)ebug, ESC to return:

-----------------------------------Messages-----------------------------------
```

Figure 5-16 LAG Ports List screen

Follow the instructions at the bottom of the screen to edit attributes and view debug information. Press **Esc** to return to the Port Information screen.

To view debug information, type D and press **Enter**. The first port is highlighted. Press the Space bar to scroll through the list. When the port you wish to view is highlighted, press **Enter**. The LAG Port Debug Information screen opens (Figure 5-17). This screen is informational only. Press **Esc** to return to the LAG Ports List.

NOTE: Debug information is for LAG debug procedures mandated by the IEEE 802.3ad standard, not Canoga Perkins specific system debug information*.*

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:42:14
-------------------------LAG PORT DEBUG INFORMATION-----------------------------

Interface:                       NET1   Admin status:            Disabled
                                        Aggregation status:      No

Rx State:                        EXPIRED
Last Rx time:                    0
Muxstate:                        DETACHED
Muxreason:
Actor Churn state:               noChurn
Partner Churn state:             noChurn
Actor Churn count:               41
Partner Churn count:             41
Actor Sync Transition count:     0
Partner Sync Transition count:   0
Actor Change count:              0
Partner Change count:            0

                                ESC to return

-----------------------------------Messages-----------------------------------
```

Figure 5-17 LAG Port Debug Information screen

To modify an aggregation port configuration, from the LAG Ports List screen (Figure 5-16), type E and press **Enter**. The first port is highlighted. Press the Space bar to scroll through the list of ports. When the port you wish to modify is highlighted, press **Enter**. The LAG Port Attributes screen (Figure 5-18) for that port opens.

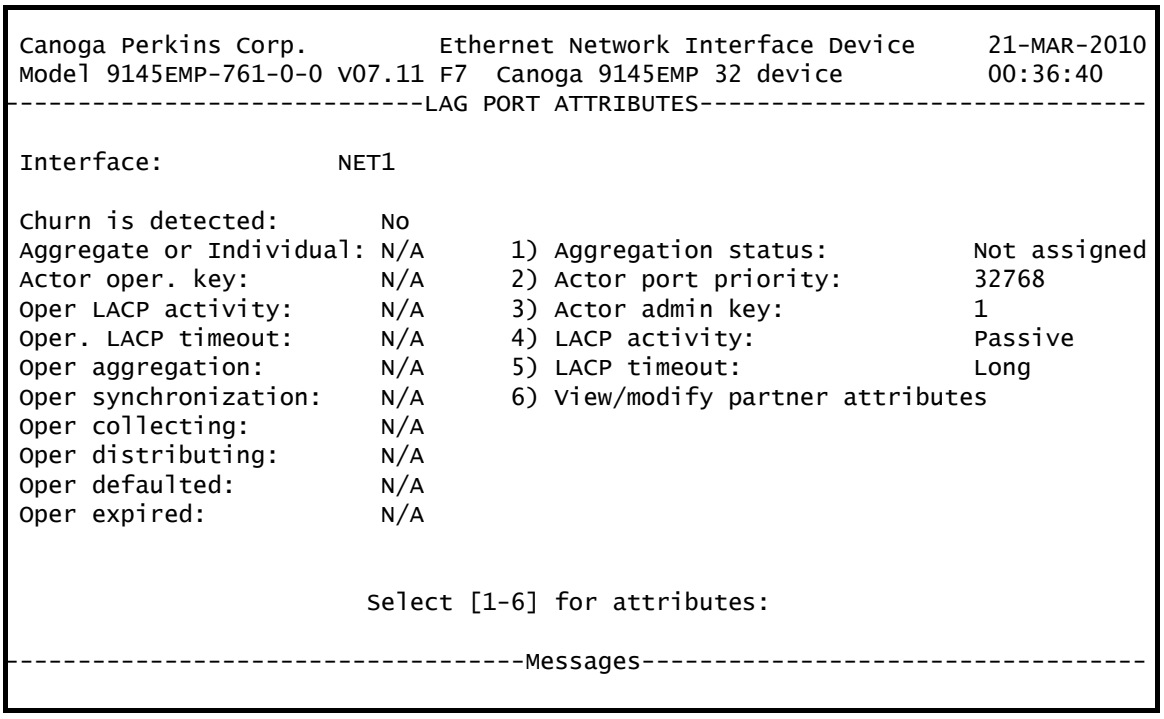
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:36:40
LAG PORT ATTRIBUTES
Interface: NET1
Churn is detected: No
Aggregate or Individual: N/A
Actor oper. key: N/A
Oper LACP activity: N/A
Oper. LACP timeout: N/A
Oper aggregation: N/A
Oper synchronization: N/A
Oper collecting: N/A
Oper distributing: N/A
Oper defaulted: N/A
Oper expired: N/A
1) Aggregation status: Not assigned
2) Actor port priority: 32768
3) Actor admin key: 1
4) LACP activity: Passive
5) LACP timeout: Long
6) View/modify partner attributes
Select [1-6] for attributes:
Messages

Figure 5-18 LAG Port Attributes screen

You can modify the following settings:

Aggregation status Type 1 and press **Enter**. Press the Space bar to select assigned or not assigned

Actor port priority The priority assigned to the port by the administrator. Type 2 and press **Enter**. Type number in range 1 - 65535 and press **Enter**.

Actor admin key Administrative key of the group (or port) used for dynamic port to aggregator mapping. Type 3 and press **Enter**. Enter number in range 1 - 65535 and press **Enter**.

LACP activity Indicates whether the port is Active or Passive from the LACP perspective. Passive ports do not initiate LACP inquiries, but responds to such requests. Type 4 and press **Enter**. Press the Space bar to select Passive or Active and press **Enter**.

LACP timeout Specifies the time interval between LACP messages. Short timeout indicates that LACP messages are sent 1 second apart, while long timeout indicates a 30 second interval. Type 5 and press **Enter**. Press the Space bar to select Long or Short and press **Enter**.

When you are finished, type A to accept and press **Enter**.

From the LAG Port Attributes screen you can also view and modify partner attributes. Type 6 and press **Enter**. The LAG Port Partner Attributes screen (Figure 5-19) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:51:32
------------------------LAG PORT PARTNER ATTRIBUTES-----------------------------

Interface:

Churn is detected:     No
Oper system address:   33:30:3A:33:30:3A 1) System address:  33:33:3A:33:30:3A
Oper system priority:  32768             2) System priority: 32768 32768
Oper key:              5                 3) Admin key:       5
Oper port:             0                 4) Admin port:      0
Oper port priority:    32768             5) Admin port prio: 32768
Oper LACP activity:    Active            6) LACP activity:   Active
Oper LACP timeout:     Long              7) LACP timeout:    Long
Oper aggregation:      No                8) Aggregation:     No
Oper synchronization:  No                9) Synchronization: No
Oper collecting:       No               10) Collecting:      No
Oper distributing:     No               11) Distributing:    No
Oper defaulted:        Yes              12) Defaulted:       No
Oper expired:          No               13) Expired:         No
                       Select [1-13] for attributes:

-----------------------------------Messages-----------------------------------
```

Figure 5-19 LAG Port Partner Attributes screen

NOTE: Changing the setting on the LAG Port Partner Attributes screen can cause undesired effects unless you are following the specific instructions in the section "Configuring a Static Link Aggregation" on page 71. Please contact Canoga Perkins technical support if you require changes on this page other than configuring a static LAG.

Parameters on this page represent the values that are assumed by the near end regarding the far end functionality, in the event of LACP failure.

System address Enter the MAC address that will be used as an administrative value for the MAC address of the far end system, when the LACP is not available.

System priority A numerical value attached to the System MAC address in order to create a unique System ID. Type 2 and press **Enter**. Type number in range 1 - 65535 and press **Enter**.

Admin key Type 3 and press **Enter**. Type number in range 1 - 65535 and press **Enter**.

Admin port Type 4 and press **Enter**. Type number in range 1 - 65535 and press **Enter**.

Admin port priority Type 5 and press **Enter**. Type number in range 1 - 65535 and press **Enter**.

LACP activity Indicates whether the port is Active or Passive from the LACP perspective. Passive ports do not initiate LACP inquiries, but responds to such requests. Type 6 and press **Enter**. Press the Space bar to select Active or Passive and press **Enter**.

LACP timeout Specifies the time interval between LACP messages. Short timeout indicates LACP messages are sent 1 second apart, while long timeout indicates a 30 seconds interval. Type 7 and press **Enter**. Press the Space bar to select Long or Short and press **Enter**.

Aggregation Indicates that the port is part of an aggregation group. Type 8 and press **Enter**. Press the Space bar to select Yes or No and press **Enter**.

Synchronization Indicates whether the LACP synchronization with the peer port is complete. Type 9 and press **Enter**. Press the Space bar to select Yes or No and press **Enter**.

Collecting Indicates whether the collection function (that is, the receive direction of the port) is active. Type 10 and press **Enter**. Press the Space bar to select Yes or No and press **Enter**.

Distributing Indicates whether the distribution function (that is, the transmit direction of the port) is active. Type 11 and press **Enter**. Press the Space bar to select Yes or No and press **Enter**.

Defaulted Indicates that the synchronization process for this port is still in process and that the default settings for the port are used in the interim. Type 12 and press **Enter**. Press the Space bar to select Yes or No and press **Enter**.

Expired Indicates that the LACP information is expired and the synchronization stage will be restarted. Type 13 and press **Enter**. Press the Space bar to select Yes or No and press **Enter**.

5.6.1.3 Configuring a Static Link Aggregation

A static LAG is fixed and will not send LACP frames or process-received LACP frames; it will not dynamically exchange information with the LAG partner. Use the following steps to configure a static LAG.

1. In the LAG Aggregation Group Attributes screen (Figure 5-15), type 1 and press **Enter**. Set the Admin status to Enabled.
2. In the LAG Ports List screen (Figure 5-16), type E and press **Enter** to edit port attributes for the selected Network port, for example, NET1.
3. In the LAG Port Attributes screen for the selected Network port, set the Assignment status (1) to Assigned and the LACP activity field (4) to Passive, as in Figure 5-20.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JUN-2010
Model 9145EMP-761-0-0 V07.11 F7                                     15:19:08
----------------------------LAG PORT ATTRIBUTES-------------------------------
Interface:            NET1

Churn is detected:       No
Aggregate or Individual: Ind      1) Assignment status:           Assigned
Actor oper. key:         32769    2) Actor port priority:         32768
Oper LACP activity:      Active   3) Actor admin key:             1
Oper LACP timeout:       Long     4) LACP activity:               Passive
Oper aggregation:        No       5) LACP timeout:                Long
Oper synchronization:    Yes      6) View/modify partner attributes
Oper collecting:         No
Oper distributing:       No
Oper defaulted:          Yes
Oper expired:            No

                        Select [1-6] for attributes:

-----------------------------------Messages-----------------------------------
```

Figure 5-20 Configuring Static LAG: LAG Port Attributes screen

4. Type 6 to go to the LAG Port Partner Attributes screen (Figure 5-21).
5. In the LAG Port Partner Attributes screen, set the following four attributes to Yes, as in Figure 5-21:
    - 8) Aggregation
    - 9) Synchronization
    - 10) Collecting
    - 11) Distributing

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JUN-2010
Model 9145EMP-761-0-0 V07.11 F7                                     15:23:33
------------------------LAG PORT PARTNER ATTRIBUTES----------------------------

Interface:            NET1

Churn is detected:     No
Oper system address:   00:40:2A:04:E5:47 1) System address:  00:40:2A:04:E5:47
Oper system priority:  32768             2) System priority: 32768
Oper key:              1                 3) Admin key:       1
Oper port:             0                 4) Admin port:      0
Oper port priority:    32768             5) Admin port prio: 32768
Oper LACP activity:    Passive           6) LACP activity:   Passive
Oper LACP timeout:     Long              7) LACP timeout:    Long
Oper aggregation:      No                8) Aggregation:     Yes
Oper synchronization:  No                9) Synchronization: Yes
Oper collecting:       No               10) Collecting:      Yes
Oper distributing:     No               11) Distributing:    Yes
Oper defaulted:        No               12) Defaulted:       No
Oper expired:          No               13) Expired:         No

                       Select [1-13] for attributes:

-----------------------------------Messages---------------------------------
```

Figure 5-21 Configuring Static LAG: LAG Port Partner Attributes screen

6. Return to the LAG Ports List screen (Figure 5-16) and repeat steps 2-5 for NET2.

5.6.2 LAG Statistics

From the Link Aggregation Main Menu (Figure 5-13), type 2 and press **Enter**. The LAG Statistics screen (Figure 5-22) opens.

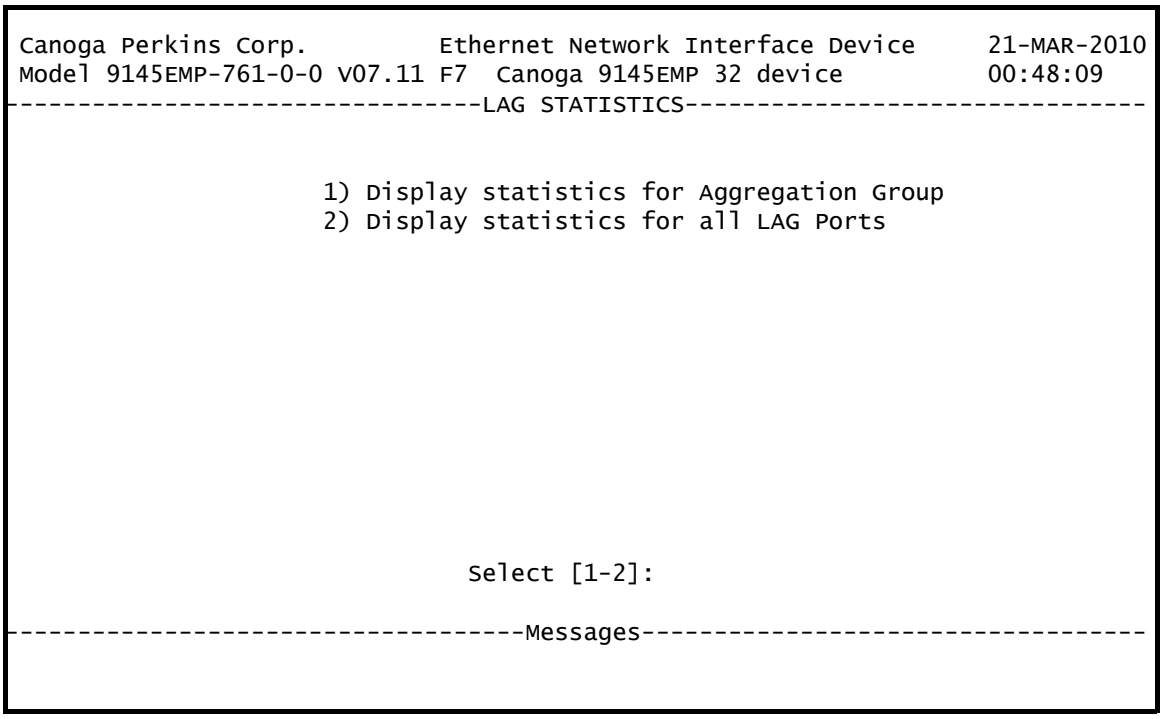
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:48:09
LAG STATISTICS
1) Display statistics for Aggregation Group
2) Display statistics for all LAG Ports
Select [1-2]:
Messages

Figure 5-22 LAG Statistics screen

5.6.2.1 Aggregation Group Statistics

To view Aggregation Group statistics, from the LAG Statistics screen (Figure 5-22), type 1 and press **Enter**. The LAG Aggregation Group Total Statistics screen (Figure 5-23) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     17-MAR-2010
Model 9145EMP-761-0-0 V11.15 F11           MP-32                    07:30:52
--------------------LAG AGGREGATION GROUP TOTAL STATISTICS----------------------

Index:                    LAG1

Data rate:                 2000000000

Tx Octets OK:              0            Rx Octets OK:            0
Tx Frames OK:              0            Rx Frames OK:            0
Tx Multicast Frames OK:    0            Rx Multicast Frames OK:  0
Tx Broadcast Frames OK:    0            Rx Broadcast Frames OK:  0
Tx Frames discarded:       0            Rx Frames discarded:     0
Frames with Tx Errors:     0            Frames with Rx Errors:   0
                                        Unknown protocol frames: 0



                 Select [(R)eset counters, ESC to return]:


-----------------------------------Messages-----------------------------------
```

Figure 5-23 LAG Aggregation Group Total Statistics screen

5.6.2.2 LAG Port Statistics

To display statistics for all ports, from the LAG Statistics screen (Figure 5-22), type 2 and press **Enter**. The LQG Port Debug Information screen (Figure 5-24) opens.

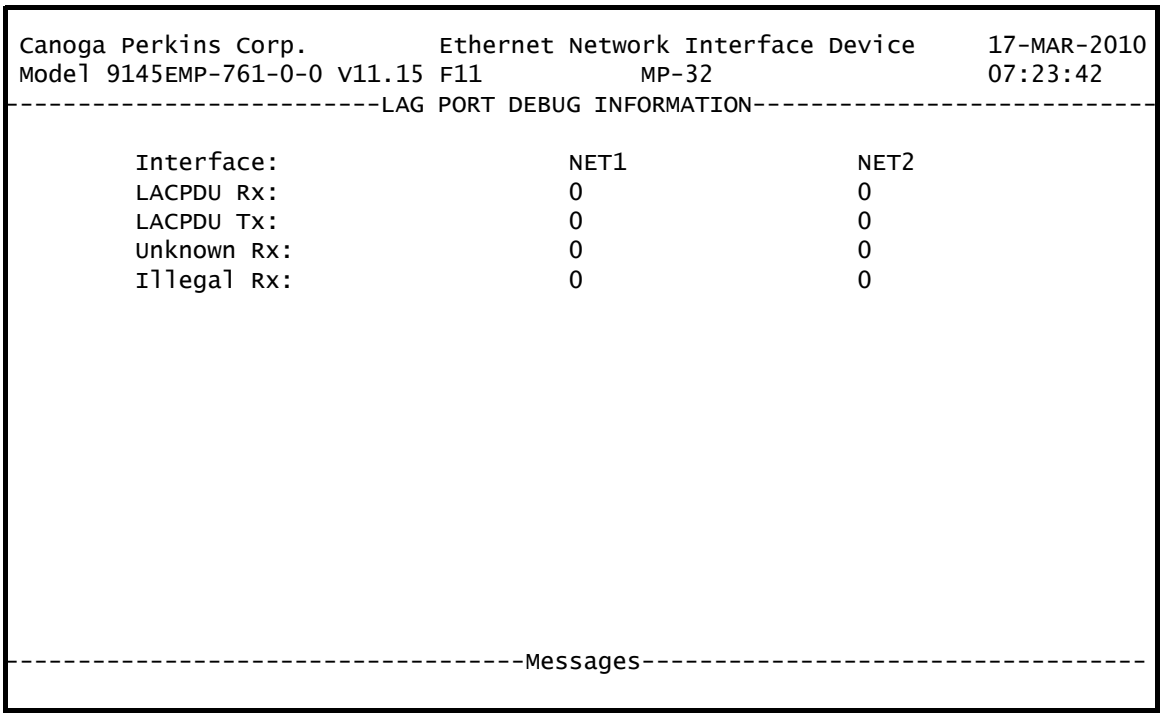
Canoga Perkins Corp. Ethernet Network Interface Device 17-MAR-2010
Model 9145EMP-761-0-0 V11.15 F11 MP-32 07:23:42
LAG PORT DEBUG INFORMATION
Interface: NET1 NET2
LACPDU Rx: 0 0
LACPDU Tx: 0 0
Unknown Rx: 0 0
Illegal Rx: 0 0
Messages

Figure 5-24 LAG Port Debug Information screen

Chapter 6

System Alarms & Logs

6.0 System Alarms

Use the System Alarms screen to view alarms and faults on the 9145EMP.

To view alarm status, select System Alarms (4) from the Main Menu and press **Enter**. The System Alarms screen (Figure 6-1) opens. Press **Esc** to return to the Main Menu.

```
Canoga Perkins Corp.          Ethernet Network Interface Device    17-MAR-2010
Model 9145EMP-761-0-0 V11.15 F11  Canoga 9145EMP 32 device         07:16:47
-----------------------------------SYSTEM ALARMS--------------------------------

                              Link              Remote Fault       SFP
Transmitter
User Port 1                    Up                  N/A              N/A

User Port 2                    Up                  N/A              N/A

User Port 3                    *** Down ***        N/A              N/A

User Port 4                    *** Down ***        N/A              N/A

Network Port 1                 Up                  No               OK

Network Port 2                 Up                  No               OK

MGMT UTP Port                  *** Down ***        N/A              N/A


AC 120/240 PS Status           OK    5.25 Volts Output (4.83 < OK < 5.49)

Main Board Voltages            All mainboard voltages OK
Fan Status                     Both Fans Ok
Temperature Status             OK 30.0C  (0.0C < OK < 70.0C)

                Press ESC to return to the previous menu
```

Figure 6-1 System Alarm screen

6.1 System Log

The System Log lists all events that occurred since the last power-up or since the log was last cleared. The log lists items with the most current item at the top. As events fill the System Log, older events drop off. The Event Types include:

- **System** system-level resources
- **Trap** also reported to the Network Manager
- **Security** security information and violations. An asterisk (*) Local event indicates that the user has an account defined on the local User Account screen.
- **Config** configuration changes and the username of the entity that made the change.

To view the System Log, select System Log (5) from the Main Menu and press **Enter**.

To page through the entries, type F for the first page, type N for the next page, type P for the previous page, or type L for the last page.

To go to a specific event number (for example, entry number 2457) type G, and then type the entry number.

To clear the system log, type C. To return to the Main Menu, press **Esc**.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     16-JUN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device            11:13:32
---------------------------------SYSTEM LOG-------------------------------------
Description                   Type      Username   Local  Date/Time
           Displaying 1 to 7 of 7 filtered entries, 7 total
Log cleared
                              System    admin        *    16-JUN-2009 11:00:41.50
Changed User Port OAM event log frequency: 0 (in 100 ms)
                              Config    SYSTEM       *    16-JUN-2009 11:05:02.50
Changed Net Port OAM event log frequency: 0 (in 100 ms)
                              Config    SYSTEM       *    16-JUN-2009 11:05:02.90
File 9145e.cfg is successfully transferred and burned via: FTP
                              Action    SYSTEM       *    16-JUN-2009 11:05:02.50
User logged out
                              Security  admin        *    16-JUN-2009 11:10:04.40
User logged in
                              Security  admin        *    16-JUN-2009 11:12:37.10
System time set by SNTP: 16-JUN-2009 11:13:09
                             System    SYSTEM       *    16-JUN-2009 11:13:09.30


 Select [(F)irst, (N)ext, (P)rev, (L)ast, (G)oto, (C)lear, (S)elect Filter]:
-----------------------------------Messages--------------------------------------
```

Figure 6-2 System Log screen

6.1.1 Log Display Filter Configuration

The 9145EMP has a flexible System Log Display Filter that turns off display of log items that are not of interest to the user. For example, you can look at events that occurred around a certain date, or configuration undertaken by a particular user, or just view trap events, and so forth.

The Log Display Filter Configuration screen (Figure 6-3) allows you to reconfigure the log display filter settings.

1. From the System Log screen (Figure 6-2), type S and press **Enter**. The Log Display Filter Configuration screen (Figure 6-3) opens.
2. To modify filter configuration, type the number of the filter and press **Enter**. Press the Space bar to select On or Off and Show or Hide.

   To change all filters 4 through 15 to Show, type 16 and press **Enter**.

   To change all filters 4 through 15 to Hide, type 17 and press **Enter**.
3. Type the Date/Time Filter Starts and Date/Time Filter Ends time(s) (optional) and press **Enter**.
4. To return to the System Log screen, press **Esc**.

NOTE: If the Master filter is set to OFF, no filter changes will be applied.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     16-JUN-2009
Model 9145EMP-761-0-0 V07.11 F7    Canoga 9145EMP 32 device         11:13:32
------------------------LOG DISPLAY FILTER CONFIGURATION-----------------------
                         1. Master Filter:               On
Date/Time Filters:       2. Date/Time Filter Starts At:  0
                         3. Date/Time Filter Ends At:    0
User Name Filters:       4. "SYSTEM":                    Hide
                         5. "admin":                     Show
                         6. Others:                      Show
User Type Filters:       7. Local:                       Show
                         8. Others:                      Show
Event Type Filters:      9. System:                      Hide
                        10. Security:                    Show
                        11. Trap:                        Show
                        12. Configuration Change:        Hide
                        13. Action:                      Show
                        14. Configuration File Change:   Show
                        15. OAM Event:                   Show
                        16. Show All Event Types
                        17. Hide All Event Types

                                Select[1-17]:
-----------------------------------Messages-----------------------------------
```

Figure 6-3 Log Display Filter Configuration screen.

Chapter 7

Utilities

7.0 Utilities Menu

Use the Utilities Menu to setup and display basic information.

From the Main Menu (Figure 2-3), select Utilities (6) and press **Enter**. The Utilities Menu (Figure 7-1) opens. The sections below describe how to display and modify each feature listed on the Utilities Menu.

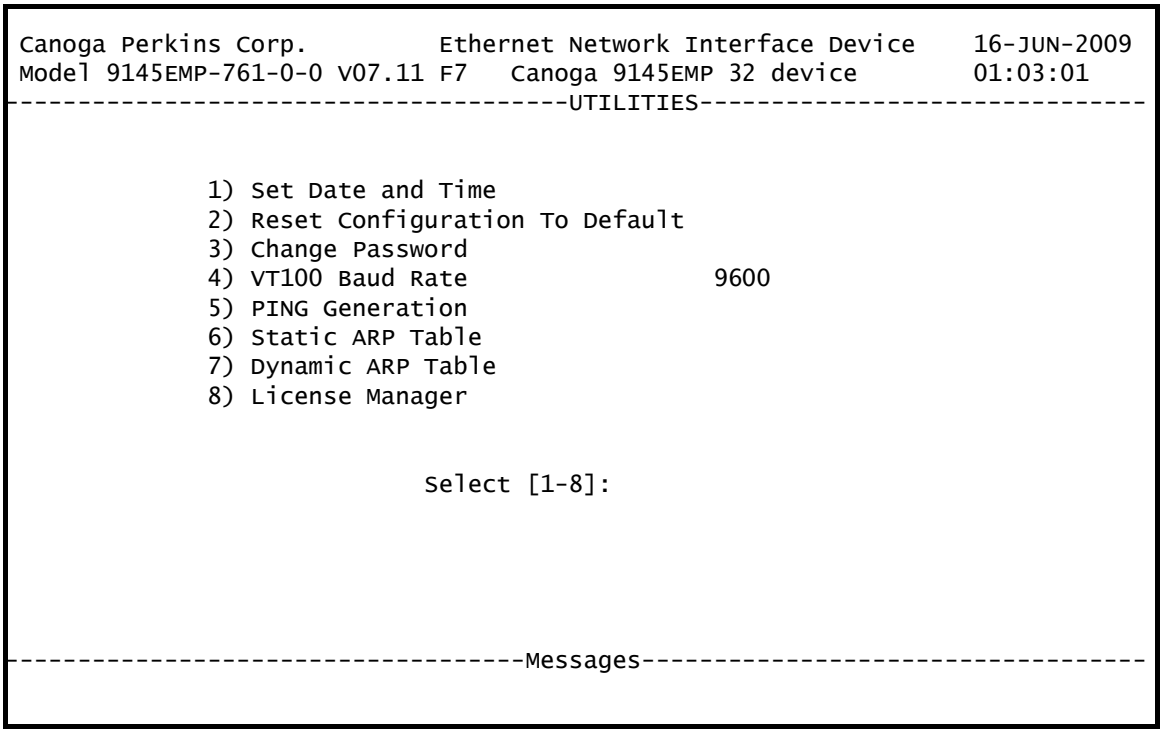
Canoga Perkins Corp. Ethernet Network Interface Device 16-JUN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:03:01
UTILITIES
1) Set Date and Time
2) Reset Configuration To Default
3) Change Password
4) VT100 Baud Rate 9600
5) PING Generation
6) Static ARP Table
7) Dynamic ARP Table
8) License Manager
Select [1-8]:
Messages

Figure 7-1 Utilities Menu

7.1 Set Date and Time

To set the correct date and time, type 1 and press **Enter**. Type the current date and time in DD/MM/YYYY HH:MM:SS format. Press **Enter** to confirm the setting. Note that SNTP will overwrite the setting on the next poll if SNTP is enabled.

7.2 Reset Configuration To Default

To reset the configuration to the default settings, type 2 and press **Enter**. Type Y and press **Enter.** All values, with the exception of Manager IP Address, Subnet Mask, Default Gateway, Management Port, Manager's VLAN Configuration and ID, Test IP and Subnet Mask, and User and Network Port settings will be returned to factory settings and the system will be reset.

NOTE: During reset all host connections will be terminated.

7.3 Change Password

To change your current password, from the Utilities Menu, type 3 and press **Enter**. The Change Password screen (Figure 7-2) opens.

1. Type the current password and press **Enter**.
2. Type the new password and press **Enter**.
3. Retype the new password and press **Enter**.

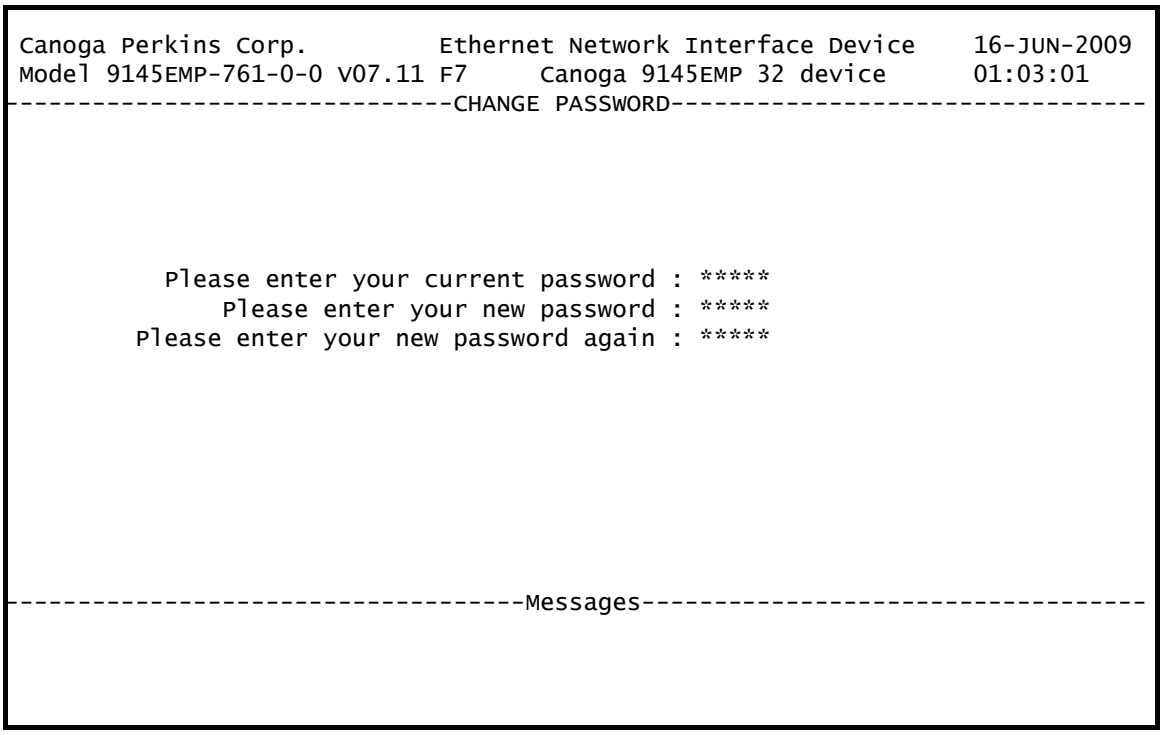
Canoga Perkins Corp. Ethernet Network Interface Device 16-JUN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:03:01
CHANGE PASSWORD
Please enter your current password : *****
Please enter your new password : *****
Please enter your new password again : *****
Messages

Figure 7-2 Change Password screen

7.4 VT100 Baud Rate

To change the VT100 baud rate, from the Utilities Menu, type 4 and press **Enter**. The baud rate setting will be highlighted. Press the Space bar to select 9600 or 19200. Press **Enter** to confirm the setting.

7.5 PING Generation

From the Utilities Menu, type 5 and press **Enter**. The PING Generation screen (Figure 7-3) opens.

NOTE: PING Generation is also available from the Diagnostics Menu. See the chapter on Diagnostics for information on how to set up the Ping Generation screen.

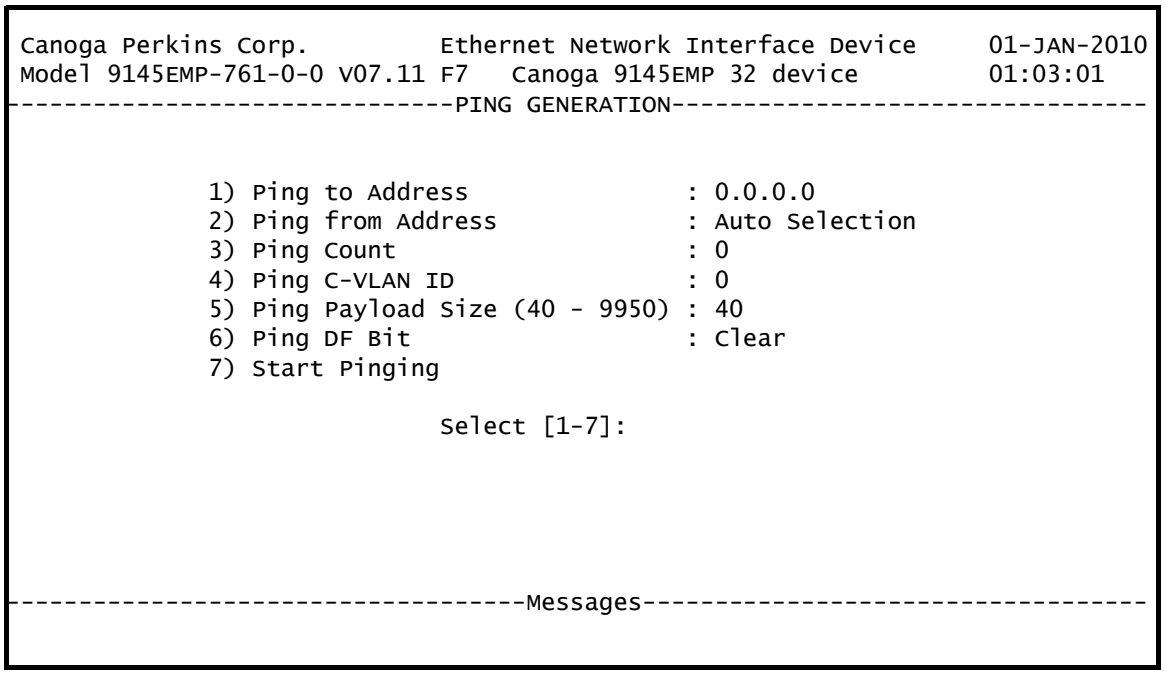
Canoga Perkins Corp. Ethernet Network Interface Device 01-JAN-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:03:01
PING GENERATION
1) Ping to Address : 0.0.0.0
2) Ping from Address : Auto Selection
3) Ping Count : 0
4) Ping C-VLAN ID : 0
5) Ping Payload Size (40 - 9950) : 40
6) Ping DF Bit : Clear
7) Start Pinging
Select [1-7]:
Messages

Figure 7-3 PING Generation screen

7.6 Static ARP Table

The Static ARP table is used to define mapping between IP address and MAC address, and assign them to a port, thus bypassing the ARP mechanism. A maximum of 10 static ARP entries are available.

From the Utilities Menu, type 7 and press **Enter**. The Static ARP Table screen (Figure 7-4) opens.

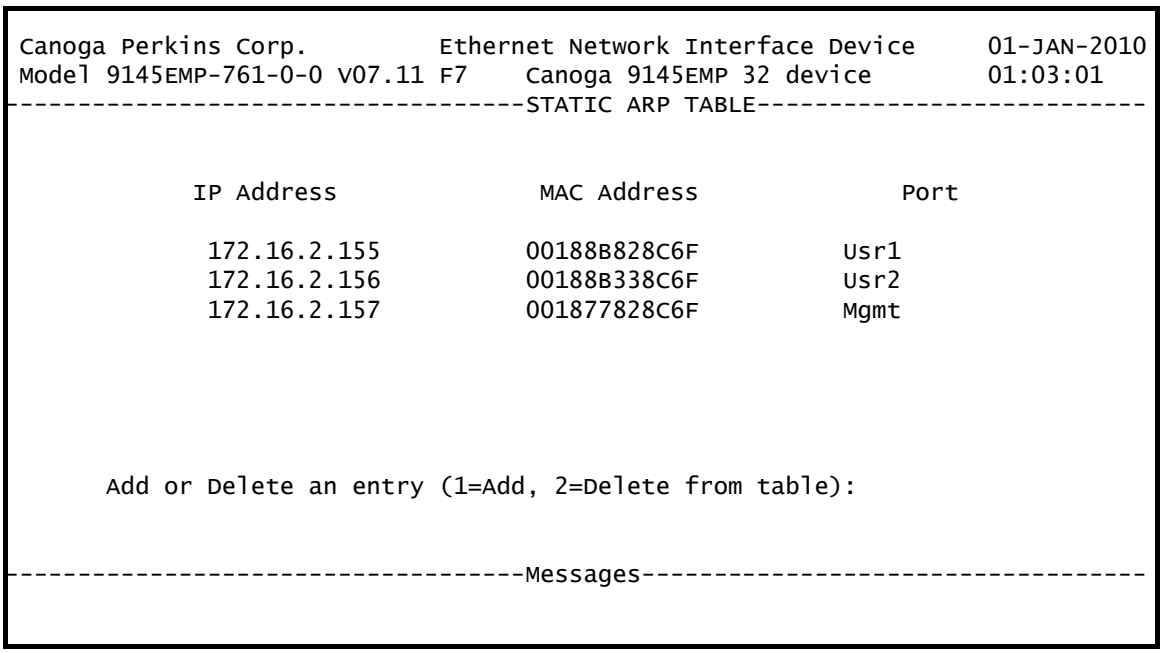
Canoga Perkins Corp. Ethernet Network Interface Device 01-JAN-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:03:01
STATIC ARP TABLE
IP Address MAC Address Port
172.16.2.155 00188B828C6F Usr1
172.16.2.156 00188B338C6F Usr2
172.16.2.157 001877828C6F Mgmt
Add or Delete an entry (1=Add, 2=Delete from table):
Messages

Figure 7-4 Static ARP Table screen

1. To add an entry to the static ARP table, type 1 and press **Enter**.
   - Type the IP address and press **Enter**.
   - Type the Mac address and press **Enter**.
   - Type the port number and press **Enter**.

   The address information is added to the table.
2. To delete an entry from the Static ARP Table, type 2 and press **Enter**. The first table entry will be highlighted. Press the Space bar to scroll through the entries. Press **Enter** to delete the highlighted entry.
3. Press **Esc** to return to the Utilities Menu.

7.7 Dynamic ARP Table

The Dynamic ARP table lists currently active IP and MAC addresses for various 9145EMP ports. Dynamic ARP entries expire after 10 minutes, unless a message exchange takes place.

1. From the Utilities Menu, type 7 and press **Enter**. The Dynamic ARP Table screen (Figure 7-5) opens. Type F (first), N, (next), P (previous) and L (last) to page through the entries.
2. To delete an entry from the table, type D and press **Enter**. The first entry is highlighted.
3. Press the Space bar to scroll through the list. When the address you wish to delete is highlighted, type CR and press **Enter**. The entry is deleted.
4. To delete all the addresses, type A and press **Enter**. You are asked to confirm that you wish to delete all the table entries. To accept, type Y and press **Enter**.
5. Press **Esc** to return to the Utilities Menu.

```
Canoga Perkins Corp.          Ethernet Network Interface Device       20-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device             01:03:01
--------------------------------DYNAMIC ARP TABLE-------------Display 1 - 4 of 4

 IP Address       MAC Address  Port  IP Address      MAC Address      Port
-------------- --------------- ----   ------------   ---------------  ----
 172.16.2.152    00188B82E598  Usr1  172.16.2.56     00A0C94B8485     Net1
 172.16.1.34     0020C500C8AF  Net1  172.16.170.110  00188B82A727     Net1
 172.16.2.145    001320CF5016  Mgmt  172.16.170.109  00188B82E6C1     Net1
 172.16.2.151    00188B82CCC8  Net1  172.16.170.108  00188B82E5B6     Net1
 172.16.14.204   001676134A88  Net1  172.16.170.115  00188B82E5E1     Net1
 172.16.1.63     0002B3A2B9BB  Net1  172.16.170.114  00188B828269     Net1
 172.16.170.103  00188B82DE79  Net1  172.16.2.134    001111EAB170     Net1
 172.16.170.102  00188B82DC08  Net1  172.16.2.132    0013721A50F4     Net1
 172.16.170.107  00188B829969  Net1  172.16.1.10     0007E9200348     Net1
 172.16.1.57     0004E2242A75  Net1  172.16.1.11     080009FD8BF9     Net1
 172.16.170.105  00188B82D8D2  Net1  172.16.2.184    00188B82E564     Net1


     Select [(F)irst, (N)ext, (P)rev, (L)ast, (D)elete, Delete (A)ll]:

-----------------------------------Messages---------------------------------------
```

Figure 7-5 Dynamic ARP Table screen

7.8 License Manager

NOTE: If you are attempting to enable a disabled license, contact Canoga Perkins for a license key. Be sure to have the Feature name and 9145EMP Serial number available***.***

The License Manager screen enables and disables the optional licenses available for the 9145EMP.

1. From the Utilities Menu, type 8 and press **Enter**. The License Manager screen (Figure 7-6) opens.
2. Type E to enable or D to disable licenses and press **Enter**. The first license entry will be highlighted. Press the Space bar to select a license.
3. Press **Enter** to enable or disable the highlighted license. If you are enabling a license you will be asked to contact Canoga Perkins:

   Contact Canoga Perkins for a License Key with the following information: Feature: CFM, Serial number: 20100105637 and Product name: 9145EMP
4. Press **Esc** to return to the Utilities Menu.

```
Canoga Perkins Corp.          Ethernet Network Interface Device    21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          01:04:23
--------------------------------LICENSE MANAGER---------------------------------
 Feature                Description                                State
  CFM                   Service OAM                                Enabled









                   Select [(E)nable],[(D)isable] Feature:

-----------------------------------Messages-------------------------------------
```

Figure 7-6 License Manager screen

Chapter 8

Software Upgrade

8.0 Flash Memory

CAUTION: Swap Bank and Software Reset or Swap Bank After Download and Reset could disrupt service

Each 9145EMP has two flash memory banks that store software. The Active Flash Memory bank holds the software that is currently in use. The Inactive Flash Memory bank holds the new software from a download, or the older version of software from a previous upgrade. Software can be downloaded into the Inactive Flash Memory bank without disrupting the normal operation of the 9145EMP. Downloading software into the Inactive Memory bank is a background operation and will not disrupt services.

From the Main Menu, select Software Upgrade (7) and press **Enter**. The Software Upgrade screen (Figure 8-1) opens. The Software Upgrade screen displays the time since the last restart, the active firmware version, the backup firmware version, and the bootcode version.

The Software Upgrade screen provides functions to reset the software, swap active flash memory banks, swap flash memory banks after a download and reset, and get a new file with TFTP.

8.1 Software Reset

1. To reset the software, type 1 and press **Enter**. Reset will be highlighted.
2. Press **Enter**. The software resets. All users will be logged off the system.

Software resets do not affect payload traffic, as long as new software is not being loaded.

8.2 Swap Bank & Reset

You can elect to exchange the current software being executed with the software stored in the inactive flash memory bank. This process will swap flash memory banks (active > inactive, inactive > active) and reset the 9145EMP to activate the setting. The software in the inactive flash memory bank will become active and the active flash memory bank will become inactive when the 9145EMP resets.

NOTE: All users will be logged off during the 9145EMP reset. In most cases, payload traffic through the 9145EMP will be disrupted for only a few frames while the FPGA is programmed with the new file*.*

To swap banks and reset the 9145EMP, type 2 and press **Enter**. Swap will be highlighted. Press **Enter**. The flash memory banks will be swapped and the 9145EMP will reset.

NOTE: The software on the new inactive flash memory bank will remain in memory and not be deleted.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           01:05:03
--------------------------------SOFTWARE UPGRADE--------------------------------

   Time Since Last Restart 00:35:42

                       Version        File Name                   File Size

   Active Firmware      43.12  9145EMP-A10(P3)-43-12.ZIP             2798146
   Inactive Firmware    00.00  9145EMP-A00(10G)-00-00.ZIP            2362124
   Bootcode             02.20  9145EMP-B00-02-20.BIN                  337562

   1)  Software Reset      Reset
   2)  Swap Bank & Reset   Swap
   3)  Swap Bank after
       download and reset  Yes

   4)  Get New File with TFTP

                            Select [1-4]:

-----------------------------------Messages-------------------------------------
```

Figure 8-1 Software Upgrade screen

8.3 Swap Bank After Download and Reset

Option 3 allows you to select automatically swapping banks on reset after a successful download. Select Yes for automatically swap banks. Select No to have downloaded software remain in the inactive bank. This option does not generate a reset.

Type 3 and press **Enter.** Press the Space bar to select Yes or No.

NOTE: Users will be disconnected when the 9145EMP is reset.

The setting "Swap Bank after download and reset" must be set before downloading the new software. After you download software, the message line will read *Loads xx.xx on Next Reset*.

8.4 Get Software Upgrades with TFTP

Software can be downloaded from the Canoga Perkins web site to your TFTP server. After downloading the software, move the file to a known directory to which your TFTP server has access.

To download the latest version from your TFTP server to the 9145EMP, from the Software Upgrade menu (Figure 8-1) type 4 and press **Enter**. The TFTP Upgrade screen (Figure 8-2) will appear.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           01:05:03
----------------------------------TFTP SOFTWARE UPGRADE-------------------------

   Time Since Last Restart 00:42:39



   Host IP Address :               172.16.2.40

   File Name: 9145EMP-a06-02-09.zip
   File transfer to unit now ?     Y




   TFTP transfer in progress...\


-----------------------------------Messages---------------------------------


```

Figure 8-2 TFTP Software Upgrade screen

1. Enter the IP Address of the Host TFTP server or press **Enter** to accept default address.
2. Enter the file name of the software you want to download and press **Enter**.
   a. Type Y and press **Enter** to begin the download. Progress can be viewed in the message line.
   b. Type N and press **Enter** to cancel the download and return to the Software Upgrade screen.
3. When the download is complete, press **Enter** to return to the Software Upgrade screen. The new software version should appear in the *Inactive Firmware* field. If Swap Bank after download and reset was set, the message: Loads xx.xx on Next Reset will appear on the message line.

8.5 Software Upgrades Using FTP or SFTP

8.5.1 Software Download using FTP

Software upgrades can also be downloaded from the Canoga Perkins web site and installed using the computer that is the 9145EMP management host.

1. Go to the Canoga Perkins web site or contact Canoga Perkins Customer Service to obtain the latest version of the 9145EMP software and copy the file to the 9145EMP management host.
2. Open a Command Prompt by selecting **Start >Run**
3. Type CMD into the OPEN window and click **OK**. The Command Prompt screen will open (Figure 8-3).

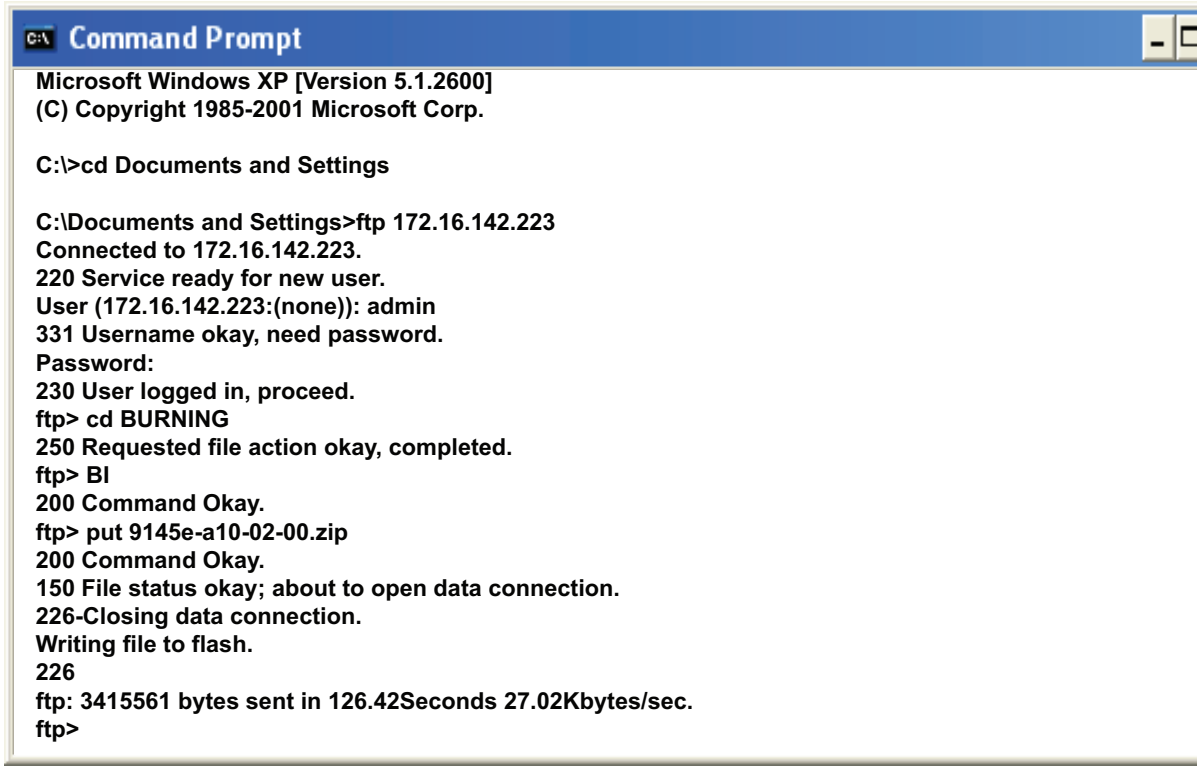

Figure 8-3 Command Prompt screen

NOTE: Confirm that the IP address of your computer is listed in the 9145EMP host table. If not, you can not access the 9145EMP. To add the computer IP address in the host table, refer to "Host Table" on page 16.

4. If required, type cd *directory name*.

   Where directory name is the name of the directory where the software upgrade is located.
5. Press **Enter**. The prompt will be relocated to that directory.
6. At the directory prompt, type ftp *IP address*

   Where *IP address* is the management IP address for the 9145EMP.
7. Press **Enter**. Service will be established.

8. Type your 9145EMP account user name and press **Enter**.
9. Type your password and press **Enter**. The ftp> prompt opens.
10. At the ftp> prompt, type *cd BURNING* (case sensitive) and press **Enter.**
11. At the ftp> prompt, type bi (for binary) and press **Enter**. This informs the 9145EMP that this will be a binary rather than a text download. Another ftp> prompt will open.
12. At the ftp> prompt, type *put (filename)*

    Where (filename) is the filename of the software upgrade. The command will be accepted and the download starts.

NOTE: The 9145EMP displays the number of bytes transferred. A separate message indicates the Flash Burning status, including percentage complete.

13. Once the software upgrade is downloaded, a notification that the data connection has been closed and that the upgrade is being written to the 9145EMP flash memory will be displayed.
14. When the upgrade has been completely written to memory, a record of the file transfer will be displayed.
15. Close the Command Prompt window.

8.5.2 Software Download using SFTP

For secure file transferring, the 9145EMP provides a Secure File Transfer Protocol (SFTP) server. The server is available to run with the SFTP client of your choice.

NOTE: Use the default settings for the SFTP Client program.

1. Start your Secure File Transfer Client and select Quick Connect or Open.
2. Enter the IP address of your 9145EMP, and your 9145EMP username.
3. A dialog opens. If this is your first time contacting the host, you will be asked if you want to use the keys. Click OK. A password dialog opens.
4. Enter your password for the 9145EMP account. Type *cd BURNING* (case sensitive) and press **Enter** to direct the software upgrade to the proper directory in the 9145EMP.
5. Transfer the software upgrade to the BURNING directory.
6. Type the file name and press **Enter.** If you are using a GUI SFTP client, you can drag and drop the upgrade file.

Chapter 9

Link OAM

9.0 Operation, Administration and Maintenance

Operation, Administration, and Maintenance (OAM) is defined in Section 57 of the IEEE 802.3-2005 standard. Its functions provide mechanisms for monitoring link operations at the data link layer, such as remote fault indication and remote loopback control. OAM provides network operators with the ability to monitor the health of the network and quickly determine the location of any failing links or fault conditions. OAM provides data link layer mechanisms that complement applications that may reside in higher layers, such as Connectivity Fault Management (CFM) 802.1ag. OAM is supported via SNMP with the standard dot3Oam.my and the Canoga Perkins proprietary cpDot3Oam.my MIB files.

From the Main Menu, select Link OAM (9) and press **Enter**. The Link OAM menu (Figure 9-1) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           01:05:03
----------------------------------Link OAM MENU----------------------------




                             1) OAM Control
                             2) OAM Peer Information
                             3) OAM Statistics
                             4) OAM Event Configuration
                             5) OAM Event Log



                                Select [1-5]:

-----------------------------------Messages-------------------------------------
```

Figure 9-1 Link OAM Menu

9.1 OAM Control

From the Link OAM screen, select OAM Control (1) and press **Enter**. The OAM Control (Figure 9-2) opens.

The OAM Control screen has two sections. The top of the screen shows status information. The bottom of the screen allows you to control the OAM settings and displays configuration parameters. Each screen contains Link OAM status and configuration for two ports. To navigate to different ports, use the (N)ext and (P)revious commands. Press **Esc** to return to the Link OAM menu.

The standard configuration parameters and their corresponding MIB objects are listed in the section "User Interface MIB Objects".

```
Canoga Perkins Corp.         Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          01:05:03
-------------------------------------OAM CONTROL------------------------------
                                 Usr1 Port               Usr2 Port
                                 ---------               ---------
OAM Operational Status           Disabled                Disabled
OAM Max PDU Size                 1518                    1518
OAM Revision                     1                       1
OAM Functions Supported          Loopback                Loopback
                                 Link Events             Link Events


OAM Loopback Status              No Loopback             No Loopback
OAM Remote Link Fault            No                      No

1) OAM Admin State               Disabled                Disabled
2) OAM Mode                      Active                  Active
3) OAM Loopback Command          No Loopback             No Loopback
4) Process Rx Loopback OAMPDU    No                      No
5) Fwd Critical Event            No                      No
                        Select [(N)ext, (P)rev, or [1-6]]:
-----------------------------------Messages-----------------------------------
```

Figure 9-2 OAM Control screen

9.1.1 OAM Operational Status

At initialization and failure conditions, two OAM entities on the same full-duplex Ethernet link begin a discovery phase to determine what OAM capabilities may be used on that link. The following is the list of possible values:

Disabled Returned if OAM is disabled on this interface via the OAM Admin State.

Link Fault If the link has detected a fault and is transmitting OAMPDUs with a link fault indication, the value is link Fault. This value will also be returned if the interface is not operational.

Passive Wait Returned only by OAM entities in OAM Mode passive. Reflects the state in which the OAM entity is waiting to see if the peer device is OA capable.

Active Send Local Used by active mode devices. This value reflects the OAM entity actively trying to discover whether the peer has OAM capability.

Send Local And Remote The local OA entity has discovered the peer but has not yet accepted or rejected the configuration of the peer. The local device can, for whatever reason, decide that the peer device is unacceptable and decline OAM peering.

Peering Locally rejected Message displayed when the local OAM entity rejects the peer OAM entity.

Send Local and remote OK OAM peering is allowed by the local device.

OAM peering Remotely Rejected The remote OAM entity rejects the peering.

Operational Local and remote OAM entities have accepted the peering and OAM is up and running.

Non OperHalf Duplex This message is displayed when OAM is enabled on a half duplex link, as it is not intended to function on a half duplex link.

9.1.2 OAM Max PDU Size

This is the OAM maximum PDU size that the 9145EMP supports. If the OAM maximum PDU size of the 9145EMP differs from that of its peers, the smaller of the two maximum OAMPDU sizes will be used between the peers.

9.1.3 OAM Revision

The revision number increments when there is a change in the OAM configuration of the 9145EMP. The change in revision number triggers the peer to re-evaluate whether OAM peering is allowed.

9.1.4 OAM Functions

The following functions are communicated to the peer and supported in the 9145EMP OAM application.

1. **Unidirectional** The 9145EMP supports the transmission of OAM PDU on links that are operating in unidirectional mode.
2. **LoopBack** The 9145EMP can initiate and respond to loopback commands.
3. **Link Events** The 9145EMP can send and receive event notification OAMPDU.

9.1.5 OAM Loopback Status

This setting returns the status and states. Four states are available: no loopback, initiating loopback, remote loopback, and terminating loopback.

9.1.6 OAM Remote Fault

This setting indicates whether a remote fault OAM PDU was sent by the peer to the 9145EMP.

9.1.7 OAM Admin State

This setting enables or disables OAM in the 9145EMP.

9.1.8 OAM Mode

Two modes can be configured in every port of the 9145EMP. In active mode, the port initiates the autodetection procedure with the far end, and can initiate remote loopback requests. When two ports are connected, at least one side must be in active mode. Passive mode cannot initiate functions such as loopback or generate a critical event.

9.1.9 OAM Loopback Command

This command allows you to start or terminate an existing remote loopback.

9.1.10 Process Rx Loopback OAM PDU

This setting allows you to process or ignore incoming OAMPDU.

9.1.11 FWD Critical Event

This setting controls whether a user port will send a critical event when the corresponding network port goes down. This setting is operational only if an All-to-One Bundling service multiplexing is configured on the user port. The attribute is not configurable for Network Ports.

9.1.12 User Interface MIB Objects

The standard configuration parameters and their corresponding MIB objects are:

- FWD Critical Event cpDot3OamForwardCriticalEvent (cpdot3oam.my)
- OAM Admin State dot3OamAdminState (dot3oam.my)
- OAM Functions Supported dot3OamFunctionsSupported (dot3oam.my)
- OAM Loopback Command dot3OamLoopbackStatus (dot3oam.my)
- OAM Loopback Status Dot3OamLoopbackStatus (dot3oam.my)
- OAM MAX PDU Size dot3OamMaxOamPduSize (dot3oam.my)
- OAM Mode dot3OamMode (dot3oam.my)
- OAM Operational Status dot3OamOperStatus (dot3oam.my)
- OAM Remote Link Fault
- OAM Revision dot3OamConfigRevision (dot3oam.my)
- Process Rx Loopback OAMPDU dot3OamloopbackIgnoreRx (dot3oam.my)

9.2 OAM Peer Information

The OAM Peer Information screen (Figure 9-3) displays information about the OAM peer for a particular Ethernet-like interface. Each screen contains Link OAM status and configuration for two ports.

OAM entities communicate with a single OAM peer entity on Ethernet links on which OAM is enabled and operating properly. There is one entry in this table for each port for which information on the peer OAM entity is available.

The OAM Peer Information screen displays details about OAM Peer Status, OAM Peer MAC Address, OAM Peer Vendor, OAM Peer Vendor Info (Hex), OAM Peer Mode, OAM Peer Max PDU Size, OAM Peer Config Revision, and OAM Peer Functions Supported.

From the Link OAM screen, select OAM Peer Information (2) and press **Enter**. The OAM Peer Information screen (Figure 9-3) opens. To navigate to different ports, use the (N)ext and (P)revious commands. Press **Esc** to return to the Link OAM menu.

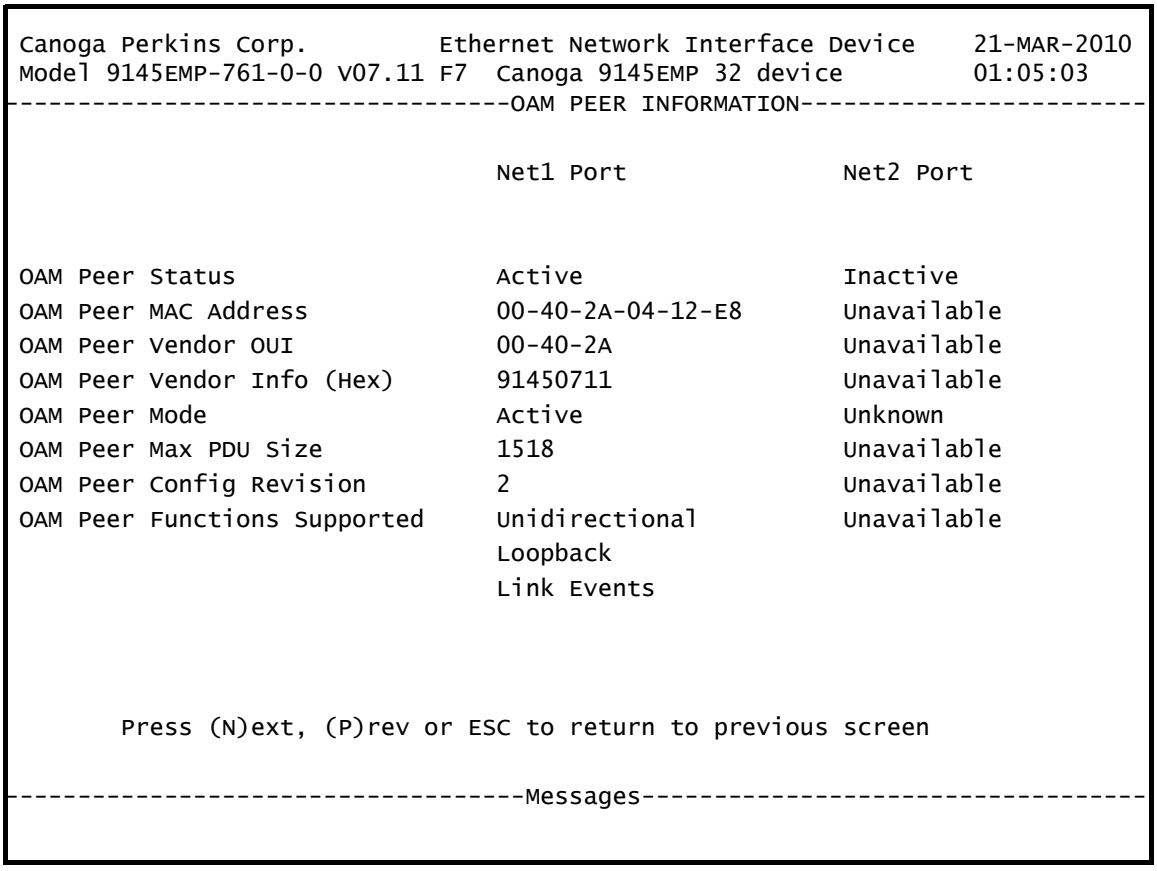

Figure 9-3 OAM Peer Information screen

9.3 OAM Statistics

The OAM Statistics screens display information about OAMPDUs, Event Notifications, Loopback Requests, Variable Requests and Responses, and Unsupported Opcodes.

From the Link OAM screen, type 3 and press **Enter**. The OAM Statistics (Current) screen (Figure 9-4) opens. Press **Esc** to return to the Link OAM menu.

```
Canoga Perkins Corp.         Ethernet Network Interface Device       21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device            01:05:03
----------------------------OAM STATISTICS (CURRENT)-------------------------------
                                      Usr1 Port              Usr2 Port
                                  Sent        Rcvd       Sent        Rcvd
                                 ---------   ---------  ---------   ---------
Information OAMPDUs                     0           0          0           0

Unique Event Notifications              0           0          0           0
Duplicate Event Notifications           0           0          0           0

Loopback Control                        0           0          0           0

Variable Requests                     N/A           0        N/A           0
Variable Responses                    N/A           0        N/A           0
Organization Specific OAMPDUs         N/A           0        N/A           0
Unsupported Opcodes                   N/A           0        N/A           0

Total OAMPDUs                           0           0          0           0

                  Select [(F)irst, (N)ext, (P)rev, (L)ast]:
            CTRL-T to view raw counters, CTRL-R to reset OAM counters,
            TAB to view Link Event Statistics, ESC to return
-----------------------------------Messages-------------------------------------
```

Figure 9-4 OAM Statistics (Current) screen

9.4 OAM Event Configuration

To configure errors in the OAM, from the Link OAM screen, type 4 and press **Enter.** The OAM Event Configuration screen (Figure 9-5) opens. Press **Esc** to return to the Link OAM menu.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          01:05:03
-------------------------------OAM EVENT CONFIGURATION-----------------------
                                                 User1 Port         User2 Port
                                                 ---------         ------------
 1) Errored Symbol Period Window                 125000000            125000000
 2) Errored Symbol Period Threshold                      1                    1
 3) Errored Frame Window (secs)                        1.0                  1.0
 4) Errored Frame Threshold                              1                    1
 5) Errored Frame Period Window                     148809               148809
 6) Errored Frame Period Threshold                       1                    1
 7) Errored Frame Seconds Window (secs)               60.0                 60.0
 8) Errored Frame Seconds Threshold                      1                    1
 9) Transmit Event Notification Count                    1                    1
10) Event Log Frequency (in 100 ms)                    600                  600
11) Send Errored Symbol Period Events                Enabled              Enabled
12) Send Errored Frame Events                        Enabled              Enabled
13) Send Errored Frame Period  Events                Enabled              Enabled
14) Send Errored Frame Seconds Events                Enabled              Enabled
15) Send Dying Gasp Events                           Enabled              Enabled
16) Send Critical Events                             Enabled              Enabled

               Select [[1-16], (F)irst, (N)ext, (P)rev, (L)ast]
-----------------------------------Messages---------------------------------
```

Figure 9-5 Event Configuration screen

9.5 OAM Event Log

The OAM Event Log Brief Display screen displays only OAM entries. From the Link OAM screen, type 5 and press **Enter**. The OAM Event Log Brief Display screen (Figure 9-6) opens.

Type F (first), N (next), P (previous) and L (last) to page through the listings. Type G (go to) to locate a particular event.

Type D (detail) to view the Event Log Detail Display screen (Figure 9-7). See "Event Log Detail Display" on page 101 for more details.

Type S (select filter) to view the Filter Configuration screen (Figure 9-8). See "Display Filter Configuration" on page 101 for more details.

Press **Esc** to return to the Link OAM menu.

```
 Canoga Perkins Corp.         Ethernet Network Interface Device       21-MAR-2010
 Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device            01:05:03
-------------------------OAM EVENT LOG BRIEF DISPLAY--------------------------
Index  OUI    Type                  Location        Time Stamp        Value
------ ------ --------------------- ----------- ----------------- --------------
                        Updating count...
*41065 0180C2 Errored Symbol Period Remote/Net2     0 day 00:19:45      109
*41066 0180C2 Errored Symbol Period Local/Net2      0 day 00:20:10      255
*41067 0180C2 Errored Symbol Period Remote/Usr2     0 day 00:20:46       93
*41068 0180C2 Errored Symbol Period Remote/Usr2     0 day 00:21:46       81
*41069 0180C2 Errored Symbol Period Local/Usr3      0 day 00:21:56  7208960
*41070 0180C2 Errored Symbol Period Remote/Usr3     0 day 00:23:00       91
*41071 0180C2 Errored Symbol Period Local/Usr3      0 day 00:23:32  4784128
*41072 0180C2 Errored Symbol Period Remote/Usr3     0 day 00:24:01       92
 41073 0180C2 Link Fault            Local/Net2      0 day 00:49:48      N/A
 41074 0180C2 Link Fault            Local/Net2      0 day 00:00:05      N/A
 41075 0180C2 Link Fault            Local/Net2      0 day 03:54:13      N/A
 41076 0180C2 Link Fault            Local/Net2      0 day 00:03:09      N/A
 41077 0180C2 Link Fault            Local/Net2      0 day 00:00:02      N/A
 41078 0180C2 Link Fault            Remote/Net2   19 days 00:09:27      N/A
 41079 0180C2 Link Fault            Local/Net2    19 days 00:09:34      N/A


  Select [(F)irst, (N)ext, (P)rev, (L)ast, (G)oto, (D)etail, (S)elect Filter]:
-----------------------------------Messages-----------------------------------
```

Figure 9-6 Event Log Brief Display screen

9.5.1 Event Log Detail Display

On the OAM Event Log Brief Display screen (Figure 9-6), type D to view the OAM Event Log Detail Display screen (Figure 9-7).

The Event Log Detail Display screen shows all events that occurred during the current session. Type F (first), N (next), P (previous) and L (last) to page through the listings. Type G (go to) to locate a particular event.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           01:05:03
-------------------------OAM EVENT LOG DETAIL DISPLAY--------------------------

          Displaying 1390 to 1391 of 1391 filtered entries, 1391 total

Index:          41078                   Index:          41079
Time Stamp:     19 days 00:09:27.3      Time Stamp:     19 days 00:09:34.3
OUI:            0180C2                  OUI:            0180C2
Type:           Link Fault              Type:           Link Fault
Location:       Remote/Net1             Location:       Local/Net1
Window:         N/A                     Window:         N/A
Threshold:      N/A                     Threshold:      N/A
Value:          N/A                     Value:          N/A
Running Total:  N/A                     Running Total:  N/A
Event Total:    N/A                     Event Total:    N/A
Occurrence:     1                       Occurrence:     1


            Select [(F)irst, (N)ext, (P)rev, (L)ast, (G)oto]:
-----------------------------------Messages-----------------------------------
```

Figure 9-7 Event Log Detail Display screen

9.5.2 Display Filter Configuration

On the OAM Event Log Brief Display screen (Figure 9-6), type S to view the OAM Event Log Display Filter Configuration screen (Figure 9-8).

The Display Filter Configuration screen allows you to turn the Master filter on or off, and also to show or hide the location, port, and type filters.

1. To change the Master Filter setting, type 1 and press **Enter**. Press the Space bar to select On or Off. Press **Enter** to accept the setting.
2. To change the Location, Port, and Type filter settings, type the number of the specific filter and press **Enter**. Use the Space bar to select Show or Hide. Press **Enter** to accept the setting.
3. To set all of the Location, Port, and Type filter settings to Show, type 14 and press **Enter**.
4. To set all of the Location, Port, and Type filter settings to Hide, type 15 and press **Enter**.
5. Press **Esc** to return to the OAM Event Log Brief Display screen.

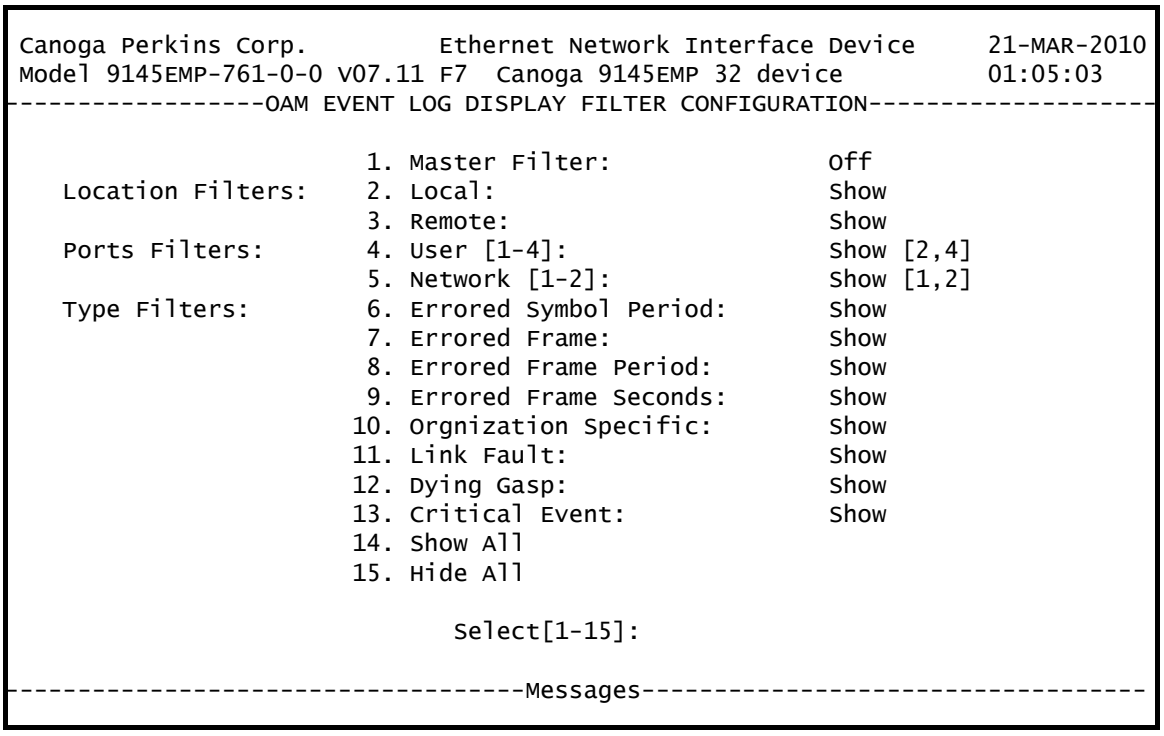
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:05:03
OAM EVENT LOG DISPLAY FILTER CONFIGURATION
Location Filters:
Ports Filters:
Type Filters:
1. Master Filter: Off
2. Local: Show
3. Remote: Show
4. User [1-4]: Show [2,4]
5. Network [1-2]: Show [1,2]
6. Errored Symbol Period: Show
7. Errored Frame: Show
8. Errored Frame Period: Show
9. Errored Frame Seconds: Show
10. Orgnization Specific: Show
11. Link Fault: Show
12. Dying Gasp: Show
13. Critical Event: Show
14. Show All
15. Hide All
Select[1-15]:
Messages

Figure 9-8 Display Filter Configuration screen

Chapter 10

CoS Configuration

10.0 Class of Service

CAUTION: When CoS Support settings are set to Enabled, disabling may lead to temporary packet loss and/or packet misordering.

When throughput exceeds the available bandwidth, Class of Service (CoS) mechanisms allow the 9145EMP to selectively drop service frames based on priority of the packets serviced. CoS processing occurs on the egress direction, that is, for frames leaving the NID.

From the Class of Service Configuration screen (Figure 10-2), you can enable or disable CoS support, including Classification, Queuing, Scheduling, and Queue Management functions.

10.1 Queues on the 9145EMP

Each User port has an independent set of four queues (Figure 10-1). The queues are labelled from highest to lowest priority:

- LLQ (Low Latency Queue)
- Q3
- Q2
- Q1

There is a single set of configuration attributes for the queues on the user side, even if the queues are independent per port. The same configuration parameters apply to all queue sets across all the ports.

On the network side, 16 queues are available, statically assigned to each ingress user port in groups of four. The first four queues are assigned for frames received on USR1, the next four for frames received on USR2, and so forth. For this reason, the screens for the network port refer only to four queues labelled LLQ to Q1; read this label as Q1 through Q4 for the queue set of the corresponding ingress user port.

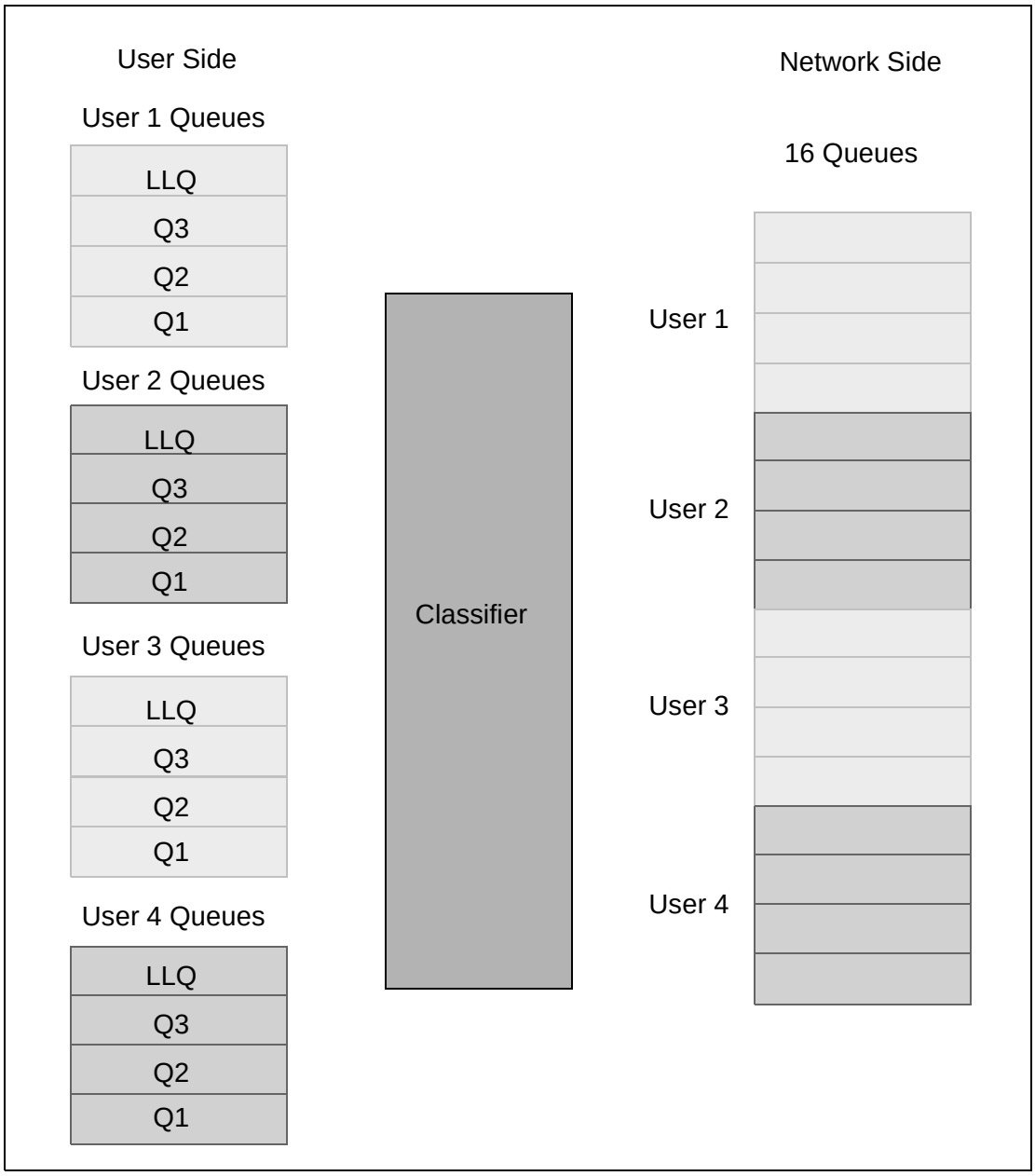

Figure 10-1 9145EMP Queues

10.2 CoS Support

To begin configuring Class of Service, from the Main Menu, select CoS Configuration (10) and press **Enter**. The Class of Service Configuration screen (Figure 10-2) opens.

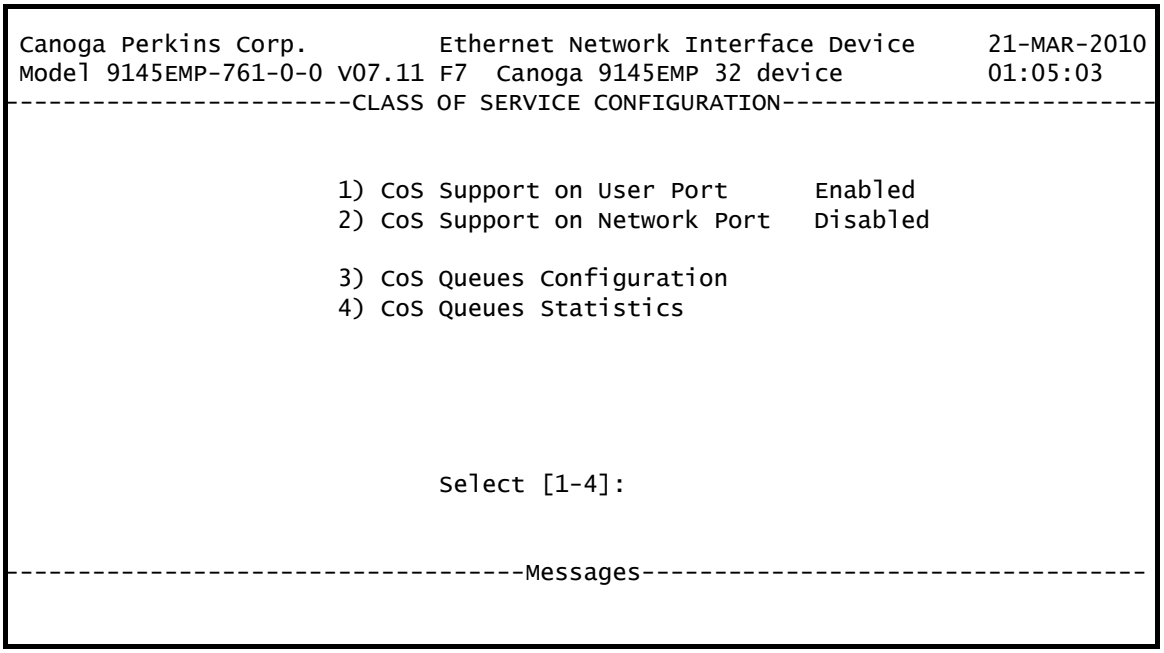
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:05:03
CLASS OF SERVICE CONFIGURATION
1) CoS Support on User Port Enabled
2) CoS Support on Network Port Disabled
3) CoS Queues Configuration
4) CoS Queues Statistics
Select [1-4]:
Messages

Figure 10-2 Class of Service Configuration screen

10.2.1 Enabling or Disabling CoS Support

To enable or disable CoS support for a port, from the CoS Configuration screen (Figure 10-2), type the number of the port you wish to configure (1 or 2) and press **Enter**. The setting is highlighted. Press the Space bar to select Enabled or Disabled and then press **Enter**.

When CoS is enabled on a given port, frames egressing on that port are subjected to queue processing.

Press **Esc** to return to the Class of Service Configuration screen.

10.3 CoS Queues Configuration

The Class of Service Queues Configuration screen allows you to choose the classification mapping and mode for tagged and untagged packets.

- Tagged packets are mapped by Priority Code Point (PCP) or C-VID (the C-VLAN ID). Network ports support PCP only.
- Untagged packets use IP Precedence, DSCP, or AF/EF modes.

From the Class of Service Configuration screen (Figure 10-2), type 3 and press **Enter**. The Class of Service Queue Configuration screen (Figure 10-3) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:03:03
-----------------------CLASS OF SERVICE QUEUE CONFIGURATION--------------------

                      1) Tagged Packet Classifier Mapping
                      2) Untagged Packet Classifier Configuration

                      3) Queues configuration on User Ports
                      4) Queues configuration on Network Ports

                      5) ED Drop Profiles on User Ports
                      6) ED Drop Profiles on Network Ports

                             Select [1-6]:



-----------------------------------Messages-----------------------------------

```

Figure 10-3 Class of Service Queue Configuration screen

10.3.1 Tagged Packet Classifier Mapping

Classifier mapping configuration applies to the ingress port. The classification mode of user ports indicates how frames that are received on the user ports are distributed to the egress queues (located on the network port) and vice versa.

The Tagged Packet Classifier Mapping screen allows you to assign a queue to a PCP, or (for user ports only) a C-VLAN ID (C-VID) value. The following are the queues available in the 9145EMP, from highest priority to lowest priority:

- LLQ (Low Latency Queue)
- Q3
- Q2
- Q1

Each port has a separate set of four queues (see Figure 10-1).

To configure queue mapping for tagged packets, from the Class of Service Queue Configuration screen (Figure 10-3), type 1 and press **Enter**. The Tagged Packet Classifier Configuration screen (Figure 10-4) opens.

1. To set the classification mode of the User port, type 1 and press **Enter**. Press the Space bar to select PCP or C-VID.
2. When you are finished, press **Enter**. Press **Esc** to return to the Class of Service Queue Configuration screen.

Note that:

- All user ports, USR1 to USR4, share the same PCP to queue classification.
- In C-VID mode, the default queue is the lowest priority queue (Q3).
- Network side configuration applies to both single port and LAG modes.
- Queues for the Network side correspond to the specific ingress user port, as described in section 10.1.
- PCP and C-VID queue mappings work in the ingress direction. For network port queues, configure the user port mappings, and vice versa.

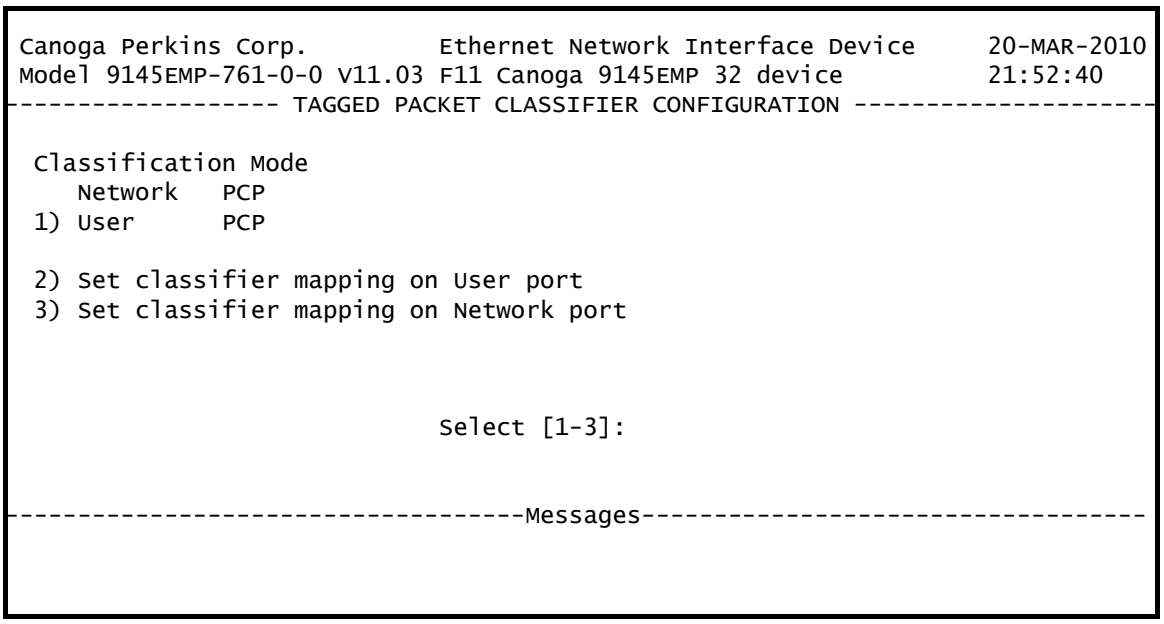
Canoga Perkins Corp. Ethernet Network Interface Device 20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device 21:52:40
TAGGED PACKET CLASSIFIER CONFIGURATION
Classification Mode
Network PCP
1) User PCP
2) Set classifier mapping on User port
3) Set classifier mapping on Network port
Select [1-3]:
Messages

Figure 10-4 Tagged Packet Classifier screen (with PCP selected)

3. To map a PCP to a queue on the User port, type 2 and press **Enter**. The User Port Tagged Packet Classifier Mapping screen opens (Figure 10-5 for PCP or Figure 10-7 for C-VID). To view the complete list of IDs and queue assignments, use CTRL-D to page down and CTRL-U to page up.
    - If you selected PCP in step 1, enter the PCP number and use the Space bar to select a queue. Press **Enter** to confirm the setting. (Only a queue that is enabled

can be selected. To enable or disable a queue, see "Queues Configuration on Network Ports" on page 116.)

- If you selected C-VID in step 1, you can use the User Port Tagged Packet Classifier Mapping screen (C-VID Mode) to select a port, change the queue assignment, and view the C-VID. See the steps in "Mapping a Queue on the User Port in C-VID Mode" on page 109.

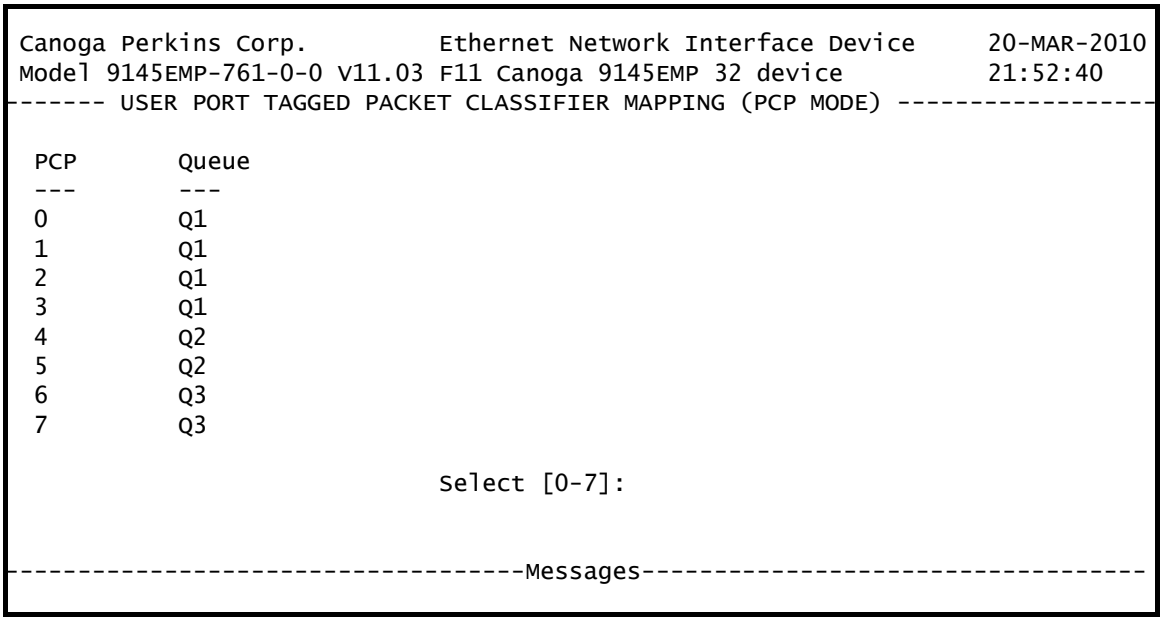

Figure 10-5 User Port Tagged Packet Classifier Mapping (PCP Mode)

4. To map a PCP to a queue on the Network port, type 3 and press **Enter**. The Network Port Tagged Packet Classifier Mapping screen (Figure 10-6) opens.
5. To change the queue setting, enter the PCP number and use the Space bar to select a queue. Press **Enter** to confirm the setting. (Only a queue that is enabled can be selected.

To enable or disable a queue, see "Queues Configuration on Network Ports" on page 116.) Network ports support PCP only.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:52:40
--------------- NETWORK PORT TAGGED PACKET CLASSIFIER MAPPING ------------------

 PCP       Queue
 ---       ---
 0         LLQ
 1         Q1
 2         Q1
 3         Q1
 4         Q2
 5         Q2
 6         Q3
 7         Q3

                              Select [0-7]:


-----------------------------------Messages-----------------------------------
```

Figure 10-6 Network Port Tagged Packet Classifier Mapping screen

10.3.1.1 Mapping a Queue on the User Port in C-VID Mode

If you selected C-VID for the User port, you can use the User Port Tagged Packet Classifier Mapping screen (C-VID Mode) (Figure 10-7) to select a port, change the queue assignment, and view the queue assignment of a particular C-VLAN or range of C-VLANs. The screen displays the first 40 C-VID queue assignments. To view more, use step 3, below.

1. To change User port, on the User Port Tagged Packet Classifier Mapping screen (C-VID Mode), type 1 and press Enter. Use the Space bar to select a User port, and then press **Enter**.
2. To change the queue assignment, type 2 and press **Enter**.
    - Enter a C-VLAN ID (C-VID) or a range of IDs from 1-4094 and press **Enter**.
    - Enter the queue ID (1-3) for Q1-Q3 or 4 for LLQ. and press **Enter**. The queue assignment changes to the new value. (Only a queue that is enabled can be selected. To enable or disable a queue, see "Queues Configuration on Network Ports" on page 116.)
3. To view the queue assignment of a particular C-VID (other than the first 40 already shown on your screen), type 3 and press **Enter**.
    - Enter a C-VLAN ID (C-VID) and press **Enter**. The screen displays a page of 40 C-VIDs, including the C-VID you selected.

4. To return to the Tagged Packet Classifier Configuration screen, press **Esc**.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:52:40
---------- USER PORT TAGGED PACKET CLASSIFIER MAPPING (C-VID MODE) ------------
 1) Port:    USR1                          Page 1 of 103 Total 4094 entries

  C-VID <=> Queue    C-VID <=> Queue    C-VID <=> Queue    C-VID <=> Queue
  ---------------    ---------------    ---------------    ---------------
      1 <=> Q3           11 <=> Q3          21 <=> Q3          31 <=> Q3
      2 <=> Q3           12 <=> Q3          22 <=> Q3          32 <=> Q3
      3 <=> Q3           13 <=> Q3          23 <=> Q3          33 <=> Q3
      4 <=> Q3           14 <=> Q3          24 <=> Q3          34 <=> Q3
      5 <=> Q3           15 <=> Q3          25 <=> Q3          35 <=> Q3
      6 <=> Q3           16 <=> Q3          26 <=> Q3          36 <=> Q3
      7 <=> Q3           17 <=> Q3          27 <=> Q3          37 <=> Q3
      8 <=> Q3           18 <=> Q3          28 <=> Q3          38 <=> Q3
      9 <=> Q3           19 <=> Q3          29 <=> Q3          39 <=> Q3
     10 <=> Q3           20 <=> Q3          30 <=> Q3          40 <=> Q3

 2) Modify assignment
 3) Go to C-VID
                              Select [1-3]:
                       CTRL-D: page down, CTRL-U: page up
-----------------------------------Messages---------------------------------
```

Figure 10-7 User Port Tagged Packet Classifier Mapping (C-VID Mode)

10.3.2 Untagged Packet Classifier Mapping

Untagged packet classifier mapping is supported on user ports only. There are three classification modes for untagged packets: IP Precedence, DSCP, and AFEF.

1. To configure queue mapping for untagged packets, from the Class of Service Queue Configuration screen (Figure 10-3), type 2 and press **Enter**. The User Port Untagged Packet Classifier Configuration screen opens (Figure 10-8).

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:36:59
-------------------- USER PORT UNTAGGED PACKET CLASSIFIER CONFIGURATION --------

 1) Classification Mode                        IP Precedence
 2) Default Queue for Unclassified Frames      LLQ

 3) Set classifier mapping



                              Select [1-3]:




-----------------------------------Messages-----------------------------------

```

Figure 10-8 User Port Untagged Packet Classifier Configuration screen

2. To select a classification mode for the User side, type 1 and press **Enter**. Press the Space bar to select IP Precedence, DSCP, or AFEF and press **Enter**.
3. To assign a default queue for unclassified frames, type 2 and press **Enter**. Press the Space bar to select LLQ, Q3, Q2, or Q1 and press **Enter**. (Only a queue that is enabled can be selected. To enable or disable a queue, see "Queues Configuration on Network Ports" on page 116.)
4. To set classifier mapping, type 3 and press **Enter**.
   - If you selected IP Precedence in step 2, Figure 10-9 opens. See the section "IP Precedence Mode" on page 112.
   - If you selected DSCP mode in step 2, Figure 10-10 opens. See the section "DSCP Mode" on page 113.
   - If you selected AFEF in step 2, Figure 10-11 opens. See the section "AF/EF Mode" on page 114.
5. Press **Esc** to return to the Class of Service Queue Configuration screen.

10.3.2.1 IP Precedence Mode

On the User Port Untagged Packet Classifier Mapping screen (Figure 10-9) for IP Precedence:

1. Type the number of the IP Precedence (or a range of numbers), and press **Enter**. The CoSQ setting in the column beside the IP Precedence number is highlighted.
2. Press the Space bar to scroll through the available queues.
3. Select a queue and press **Enter**. (Only a queue that is enabled can be selected. To enable or disable a queue, see "Queues Configuration on Network Ports" on page 116.)
4. Press **Esc** to return to the User Port Untagged Packet Classifier Configuration screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:28:24
---------------- USER PORT UNTAGGED PACKET CLASSIFIER MAPPING ------------------

                          Mode: IP Precedence Mode

                       IP Precedence    CoSQ
                       -------------    ----
                              0         Q1
                              1         Q1
                              2         Q1
                              3         Q1
                              4         Q2
                              5         Q2
                              6         Q3
                              7         Q3


                 Select IPP or a Range x-y [0-7]:

-----------------------------------Messages---------------------------------
```

Figure 10-9 User Port Untagged Packet Classifier Mapping screen (IP Precedence mode)

10.3.2.2 DSCP Mode

On the User Port Untagged Packet Classifier Mapping screen (Figure 10-10) for DSCP,

1. Type the number of the DSCP (or a range of numbers), and press **Enter**. The CoS setting for that DSCP number is highlighted.
2. Press the Space bar to scroll through the available queues.
3. Select a queue and press **Enter**. (Only a queue that is enabled can be selected. To enable or disable a queue, see "Queues Configuration on Network Ports" on page 116.)
4. Press **Esc** to return to the User Port Untagged Packet Classifier Configuration screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     22-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:57:37
---------------- USER PORT UNTAGGED PACKET CLASSIFIER MAPPING ------------------

                          Mode: DSCP Mode

DSCP CoSQ  DSCP CoSQ  DSCP CoSQ  DSCP CoSQ  DSCP CoSQ  DSCP CoSQ  DSCP CoSQ
---- ----  ---- ----  ---- ----  ---- ----  ---- ----  ---- ----  ---- ----
 0    Q1    10   Q1    20   Q1    30   Q1    40   Q2    50   Q3    60   Q3
 1    Q1    11   Q1    21   Q1    31   Q1    41   Q2    51   Q3    61   Q3
 2    Q1    12   Q1    22   Q1    32   Q2    42   Q2    52   Q3    62   Q3
 3    Q1    13   Q1    23   Q1    33   Q2    43   Q2    53   Q3    63   Q3
 4    Q1    14   Q1    24   Q1    34   Q2    44   Q2    54   Q3
 5    Q1    15   Q1    25   Q1    35   Q2    45   Q2    55   Q3
 6    Q1    16   Q1    26   Q1    36   Q2    46   Q2    56   Q3
 7    Q1    17   Q1    27   Q1    37   Q2    47   Q2    57   Q3
 8    Q1    18   Q1    28   Q1    38   Q2    48   Q3    58   Q3
 9    Q1    19   Q1    29   Q1    39   Q2    49   Q3    59   Q3


             Select DSCP or a Range x-y [0-63]:

-----------------------------------Messages-----------------------------------
```

Figure 10-10 User Port Untagged Packet Classifier Mapping screen (DSCP Mode)

10.3.2.3 AF/EF Mode

On the User Port Untagged Packet Classifier Mapping screen (Figure 10-11) for AFEF:

1. Type the number of the AF code (or a range of numbers), E for Expedited Forwarding, or D for Default Forwarding, and press **Enter**. The CoSQ setting, or the first number/value of the range (for example, 3, if 3 - 7) is highlighted.
2. Press the Space bar to scroll through the available queues.
3. Select a queue and press **Enter**. If a series of codes was chosen, all of those CoSQs will be changed.
4. Press **Esc** to return to the User Port Untagged Packet Classifier Configuration screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     22-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:59:18
---------------- USER PORT UNTAGGED PACKET CLASSIFIER MAPPING ------------------

                          Mode: AFEF Mode

                          Class 1     Class 2     Class 3     Class 4
                         DSCS  CoSQ  DSCS  CoSQ  DSCS  CoSQ  DSCS  CoSQ
                         ----  ----  ----  ----  ----  ----  ----  ----
   Low  Drop Precedence  AF11   Q1   AF21   Q1   AF31   Q1   AF41   Q2
   Med  Drop Precedence  AF12   Q1   AF22   Q1   AF32   Q1   AF42   Q2
   High Drop Precedence  AF13   Q1   AF23   Q1   AF33   Q1   AF43   Q2


   Expedited Forwarding  CoSQ:  Q3
   Default CoSQ:                Q1


   Select AF Code or a Range x-y [11-43], [E]F, [D]efault:



-----------------------------------Messages---------------------------------
```

Figure 10-11 User Port Untagged Packet Classifier Mapping screen (AFEF Mode)

10.3.3 Queues Configuration on User Ports

From the Class of Service Queue Configuration screen (Figure 10-3), type 3 and press **Enter**. The Edit Queue Configuration on User Ports screen (Figure 10-12) opens.

Type the number of the attribute you wish to configure and press **Enter**. Press **Esc** to return to the Class of Service Queue Configuration screen.

The same set of configuration attributes applies to every user port.

1. **Enable/Disable a Queue** The 9145EMP has four queues: LLQ, Q3, Q2, Q1. This function allows you to enable only the queues that are in use. Type the number of the queue you wish to enable or disable. Press the Space bar to select Enabled or Disabled and then press **Enter**.

NOTE: The LLQ cannot be disabled and the LLQ size cannot be set to zero (0)***.***

2. **Queue Size (in 8K-Byte)** The queue size can be any value from 0KB to 2MB (from 8KB to 2MB for LLQ). To change the queue size, type 2 for LLQ, 4 for Queue 3, 10 for Queue 2, or 16 for Queue 1. Type the new setting and press **Enter**.

   Queues require a size parameter range between 0 and 250 (between 1 and 250 for LLQ). If you enter an invalid size parameter, the message INVALID INPUT will appear at the bottom of the screen.

3. **Scheduling Scheme** The 9145EMP supports two scheduling modes: Strict Priority (SP) and Weigh Fair Queuing (WFQ). All queues can be set to service packets using one of the scheduling mode mentioned above to the exception to the LLQ. The LLQ is always set by default to SP. To change the schedule scheme, type 5 for Queue 3, 11 for Queue 2, or 17 for Queue 1. Press the Space bar to select Strict Priority or Weighted Fair and then press **Enter**.

4. **Weight Parameters** Queue 3, Queue 2 and Queue 1 require a Weight parameter range between 0 and 1000. If WFQ is set as the scheduling method, a weight must be assigned to each queue. The weight is proportional to the bandwidth that queue will receive. The weight value can be of any range between 0-1000.

   To change the queue weight, type 6 for Queue 3, 12 for Queue 2, or 18 for Queue 1. Type the new setting and then press **Enter**.

NOTE: If you enter an invalid weight parameter, INVALID INPUT will appear at the bottom of the screen.

5. **Enable/Disable ED Drop Profile** Every queue has two drop profiles associated with it. (For more information about ED Drop Profiles, see ""Early Detect Drop Profiles" on page 118.)

   To enable or disable ED drop profiles, type 7 or 8 for Queue 3, 13 or 14 for Queue 2, or 19 or 20 for Queue 1. Press the Space bar to change the setting and press **Enter**.

6. Press **Esc** to return to the Class of Service Queue Configuration screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     22-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:29:49
-------------------------EDIT QUEUE CONFIGURATION ON USER PORTS----------------

  1) LLQ:                 Enabled
  2) Size (in 8K-byte):   8
 ------------------------------------------------------------------------------
  3) Queue 3:             Enabled            6) Weight:               256
  4) Size (in 8K-byte):   8                  7) ED Drop Profile 3A:   Enabled
  5) Scheduling:          Weighted Fair Q    8) ED Drop Profile 3B:   Enabled
 ------------------------------------------------------------------------------
  9) Queue 2:             Enabled           12) Weight:               128
 10) Size (in 8K-byte):   8                 13) ED Drop Profile 2A:   Enabled
 11) Scheduling:          Weighted Fair Q   14) ED Drop Profile 2B:   Enabled
 ------------------------------------------------------------------------------
 15) Queue 1:             Enabled           18) Weight:               64
 16) Size (in 8K-byte):   8                 19) ED Drop Profile 1A:   Enabled
 17) Scheduling:          Weighted Fair Q   20) ED Drop Profile 1B:   Enabled

                           Select [1-20]:


-----------------------------------Messages-----------------------------------
```

Figure 10-12 Edit Queue Configuration User Ports screen

10.3.4 Queues Configuration on Network Ports

From the Class of Service Queue Configuration screen (Figure 10-3), type 3 and press **Enter**. The Edit Queue Configuration on Network Ports screen (Figure 10-13) opens.

1. **Enable/Disable a Queue** The 9145EMP has four queues: LLQ, Q3, Q2, Q1. This function allows you to enable only the queues that are in use. Type the number of the queue you wish to enable or disable. Press the Space bar to select Enabled or Disabled and then press **Enter**.

NOTE: The LLQ cannot be disabled and the LLQ size cannot be set to zero (0)***.***

2. **Queue Size (in 8K-Byte)** The queue size can be any value from 0KB to 2MB (from 8KB to 2MB for LLQ). To change the queue size, type 2 for LLQ, 4 for Queue 3, 10 for Queue 2, or 16 for Queue 1. Type the new setting and press **Enter**.

   Queues require a size parameter range between 0 and 250 (between 1 and 250 for LLQ). If you enter an invalid size parameter, the message INVALID INPUT will appear at the bottom of the screen.

3. **Scheduling Scheme** The 9145EMP supports two scheduling modes: Strict Priority (SP) and Weigh Fair Queuing (WFQ). All queues can be set to service packets using one of the scheduling mode mentioned above with the exception of the LLQ. The LLQ is always set by default to SP. To change the schedule scheme, type 5 for Queue 3, 11 for Queue 2, or 17 for Queue 1. Press the Space bar to select Strict Priority or Weighted Fair and then press **Enter**.

NOTE: The scheduling algorithm is applied to each set of four queues associated with each User Port. This means that, for example, Q1 associated with User 1 and Q1 associated with User 2 will have the same priority. In this case, the queues are serviced in a round robin fashion.

4. **Weight Parameters** Queue 3, Queue 2 and Queue 1 require a weight parameter range between 0 and 1000. If WFQ is set as the scheduling method, a weigh need to be assigned to each queue. The weight is proportional to how much bandwidth that queue will receive. The weight value can be of any range between 0-1000.

   To change the queue weight, type 6 for Queue 3, 12 for Queue 2, or 18 for Queue 1. Type the new setting and press **Enter**.

NOTE: If you enter an invalid weight parameter, INVALID INPUT will appear at the bottom of the screen.

5. **Enable/Disable ED Drop Profile** Every queue has two drop profiles associated with it. (For more information about ED Drop Profiles, see "Early Detect Drop Profiles" on page 118.) To enable or disable ED drop profiles, type 7 or 8 for Queue 3, 13 or 14 for Queue 2, or 19 or 20 for Queue 1. Press the Space bar to change the setting and press **Enter**.
6. Press **Esc** to return to the Class of Service Queue Configuration screen.

The same setting are applied for each set of four queues statically assigned to each ingress user port.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device           21:33:48
-------------------------EDIT QUEUE CONFIGURATION ON NETWORK PORTS-------------

  1) LLQ:                 Enabled
  2) Size (in 8K-byte):   8
 ------------------------------------------------------------------------------
  3) Queue 3:             Enabled             6) Weight:               256
  4) Size (in 8K-byte):   8                   7) ED Drop Profile 3A:   Enabled
  5) Scheduling:          Weighted Fair Q     8) ED Drop Profile 3B:   Enabled
 ------------------------------------------------------------------------------
  9) Queue 2:             Enabled            12) Weight:               128
 10) Size (in 8K-byte):   8                  13) ED Drop Profile 2A:   Enabled
 11) Scheduling:          Weighted Fair Q    14) ED Drop Profile 2B:   Enabled
 ------------------------------------------------------------------------------
 15) Queue 1:             Enabled            18) Weight:               64
 16) Size (in 8K-byte):   8                  19) ED Drop Profile 1A:   Enabled
 17) Scheduling:          Weighted Fair Q    20) ED Drop Profile 1B:   Enabled

                           Select [1-20]:


-----------------------------------Messages-----------------------------------
```

Figure 10-13 Edit Queue Configuration Network Ports screen

10.3.5 Early Detect Drop Profiles

Early Detect is a congestion avoidance mechanism that allows you to drop packets based on a specific profile. The drop can be selectively applied to packets with a specific PCP value or a priority. Doing so allows you to drop packets before a specific queue is full.

Every Queue has two drop profiles associated with it. You can configure a drop profile and associate it with a specific class of service, and enable or disable each ED Drop Profile independently, and set the MIN, MAX, and MID values for each queue.

From the Class of Service Queue Configuration screen (Figure 10-3), type 5 for ED Drop Profiles on User ports, or 6 for ED Drop Profiles on the Network port, and press **Enter**. The ED Drop Profile Configuration screen (Figure 10-14 for User ports, or Figure 10-15 for the Network Port) opens.

1. Press **CTRL-T** to select Drop Profile A or Profile B.
2. Type 1, 5 or 9 to set the minimum threshold percentage for the appropriate Drop Profile, press Backspace to remove the current setting, type the desired setting, and press **Enter**.
3. Type 2, 6 or 10 to set the maximum threshold percentage for the appropriate Drop Profile, use Backspace to remove the current setting, type the desired setting, and press **Enter**.
4. Type 3, 7 or 11 to set the Mid threshold percentage for the appropriate Drop Profile, use Backspace to remove the current setting, type the desired setting, and press **Enter**.
5. Type 4, 8 or 12 to view the Match Criteria for the appropriate Drop Profile. The Match Criteria screen (Figure 10-16) for the appropriate ED Drop Profile opens.
    a. Press **CTRL-T** to select A profile or B profile.
    b. Press **CTRL-D** to select DSCP or PCP menus.
    c. Type the DSCP or PCP number, or a range of numbers, and press **Enter** to highlight the Match column. Press the Space bar to select X (matched) or - (unmatched) and then press **Enter**. The next entry is highlighted.
    d. Press **Esc** to return to the bottom of the screen.
6. Press **Esc** to return to the ED Drop Profile Configuration screen.
7. Press **Esc** again to return to the Class of Service Queue Configuration screen.

To match a profile, a tagged IP packet must match both PCP and DSCP values.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device          21:36:22
-------------------USER SIDE ED DROP PROFILE CONFIGURATION---------------------
           ED Drop Profile 3A:
                1) MIN Threshold (%):                   50
                2) MAX Threshold (%):                   100
                3) MID Threshold Drop Probability (%):  50
                4) Match Criteria
         ---------------------------------------------------
           ED Drop Profile 2A:
                5) MIN Threshold (%):                   50
                6) MAX Threshold (%):                   100
                7) MID Threshold Drop Probability (%):  50
                8) Match Criteria
         ---------------------------------------------------
           ED Drop Profile 1A:
                9) MIN Threshold (%):                   50
               10) MAX Threshold (%):                   100
               11) MID Threshold Drop Probability (%):  50
               12) Match Criteria

        Enter CTRL-T to toggle profile A/B or select [1-12]:
-----------------------------------Messages-----------------------------------
```

Figure 10-14 User Port ED Drop Profile Configuration

```
Canoga Perkins Corp.         Ethernet Network Interface Device     20-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device          21:27:04
-------------------NETWORK SIDE ED DROP PROFILE CONFIGURATION------------------
           ED Drop Profile 3A:
                1) MIN Threshold (%):                   50
                2) MAX Threshold (%):                   100
                3) MID Threshold Drop Probability (%):  50
                4) Match Criteria
         ---------------------------------------------------
           ED Drop Profile 2A:
                5) MIN Threshold (%):                   50
                6) MAX Threshold (%):                   100
                7) MID Threshold Drop Probability (%):  50
                8) Match Criteria
         ---------------------------------------------------
           ED Drop Profile 1A:
                9) MIN Threshold (%):                   50
               10) MAX Threshold (%):                   100
               11) MID Threshold Drop Probability (%):  50
               12) Match Criteria

  Enter CTRL-T to toggle profile A/B or select [1-12]:
-----------------------------------Messages-----------------------------------
```

Figure 10-15 Network Port ED Drop Profile Configuration

```
Canoga Perkins Corp.          Ethernet Network Interface Device     01-JAN-2009
Model 9145EMP-761-0-0 V11.10 F11 Canoga 9145EMP 32 device           00:22:43
--------------------USER PORT MATCH CRITERIA FOR PROFILE 1A--------------------
DSCP Match DSCP Match DSCP Match DSCP Match DSCP Match DSCP Match DSCP Match
 0     X    10    X    20    X    30    X    40    X    50    X    60    X
 1     X    11    X    21    X    31    X    41    X    51    X    61    X
 2     X    12    X    22    X    32    X    42    X    52    X    62    X
 3     X    13    X    23    X    33    X    43    X    53    X    63    X
 4     X    14    X    24    X    34    X    44    X    54    X
 5     X    15    X    25    X    35    X    45    X    55    X
 6     X    16    X    26    X    36    X    46    X    56    X
 7     X    17    X    27    X    37    X    47    X    57    X
 8     X    18    X    28    X    38    X    48    X    58    X
 9     X    19    X    29    X    39    X    49    X    59    X

 PCP Match  PCP Match  PCP Match
 0     X    3     X    6     X
 1     X    4     X    7     X
 2     X    5     X

                   Select DSCP or a Range x-y [0-63]:
    Enter CTRL-D to toggle DSCP/PCP, CTRL-T to toggle profile A/B
-----------------------------------Messages-----------------------------------
```

Figure 10-16 ED Drop Profile Match Criteria (User Port)

10.4 Queue Statistics

From the Class of Service Configuration screen (Figure 10-2), type 4 and press **Enter**. The Queue Statistics screen (Figure 10-17) opens.

1. Press **CTRL-T** to view raw counters.
2. Press **CTRL-R** to clear the current counters.
3. Press **CTRL-S** to change the path. For network ports, the statistics are presented in groups of four, corresponding to each ingress user port.
4. Press **Esc** to return to the Class of Service Queue Configuration screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           01:05:03
-------------------------------QUEUE STATISTICS (CURRENT)----------------------

 Path :       NET>USR1


       Total Packets    Packets Subject    Total Packets     Total Packets
 CoSQ    Classified     To Drop Profile       Queued            Dropped
 ----  ---------------  ---------------  ----------------  ----------------

  LLQ  0                N/A              0                 0
  Q3   0                0                0                 0
  Q2   0                0                0                 0
  Q1   0                0                0                 0


  CTRL-T to view raw counters, CTRL-R to clear counters, ESC to return,
                           CTRL-S to switch the path:


-----------------------------------Messages-------------------------------------
```

Figure 10-17 Queue Statistics screen

Chapter 11

Service OAM

11.0 Introduction

Service OAM (SOAM) allows you to detect, isolate, and report connectivity faults that span networks comprised of multiple LANs, and to monitor the performance of connections.

Service OAM protocols and procedures are defined in two standards: IEEE 802.1ag and ITU-T Recommendation Y.1731. The standards specify protocols, procedures, and specific entities required to support the discovery and verification of connectivity faults and to associate the faults to specific devices. These entities and protocols are briefly described in paragraph 11.1.1 and 11.1.3

Both IEEE 802.1ag and ITU-T Y.1731 Service OAM procedures and entities are supported by the 9145EMP NID. The protocol support for these standards is shown in Table 11-1.

11.1 Service OAM

Service OAM provides Connectivity Fault Management (CFM), path discovery, and fault notification features that allow you to monitor end-to-end service connections, detect connectivity faults, and isolate defects. Continuity Check Messages (CCM) and Alarm Indication Signal (AIS) are used for connection monitoring, while Linktrace and Loopback procedures are used for fault isolation. Paragraph 11.1.3 provides more details about Service OAM features.

11.1.1 SOAM Entities

To execute the Service OAM procedures, specific entities must be configured at the network and NID level. Some of those entities are shown in Figure 11-2.

The SOAM entities are:

- **Maintenance Domain**: A maintenance domain (MD) is a managed part of a network. It is bounded by a set of ports on which maintenance association end points (MEPs) are instantiated, forming one or more maintenance associations at a particular level. An MD is identified by an MD level value, assigned by the network administrator. The MD level is used to define the hierarchical relationship between domains. Typically, higher level domains are closer to the customer, while lower level domains correspond to service providers and the physical level. Domains cannot intersect or overlap, but they can touch or nest. CFM exchanges messages and performs operations on a per domain basis.

- **Maintenance Association**: A maintenance association (MA) is a logical connection between MEPs. An MA is defined by a set of MEPs configured with identical values of maintenance association identifiers (MAID). While MDs are strictly logical entities, an MA represents the association of an administrative domain with a specific Ethernet transport entity. For example, an MA can be attached to a VLAN multiplexing record, or be VLAN unaware for low-level domains such as link-level domains.

- **Maintenance Entity Group**: The concepts of maintenance domain and maintenance association are merged in a single entity called a Maintenance Entity Group in Y.1731. As such, a MEG is a logical connection between several MEPs that are defined as the part of the same administrative domain and have the same level.

- **Maintenance Association End Point**: A MEP is an entity that is instantiated in a NID port. A MEP belongs to one MA or MEG and represents the boundaries of that specific domain. A MEP can monitor the traffic that is transmitted and received from a port towards the wire (a DOWN MEP), or it can monitor the traffic transmitted and received from the forwarding engine of a device (an UP MEP). Only a MEP can initiate SOAM requests and prevent leaking of OAM messages between domains.

- **Maintenance Intermediate Point**: A maintenance intermediate point (MIP) is an OAM entity that is instantiated in a NID port and a Management Domain or Management Entity Group. A MIP is a passive Service OAM entity. It receives Service OAM messages and responds to the originating MEP. A MIP responds to linktrace and loopback messages only. MIPs are internal to a domain, therefore they cannot be located at the domain boundary. MEPs and MIPs are generically called Maintenance Points (MPs). If a MEP or MIP is associated with a MEG, it is executing Y.1731 procedures. If it is associated with an MA or MD, it is executing 802.1ag procedures.

11.1.2 Logical Positioning of MEPs and MIPs

Untagged down MEPs can be configured on each physical User port. On the Network side, if LAG is disabled, an untagged down MEP can be configured on the active network port. If LAG is enabled, a single untagged down MEP can be configured on the LAG.

Figure 11-1 describes the logical positioning of MEPs in the 9145EMP system. We can distinguish several types of MEPs:

- Untagged MEPs, described above (and designated in dark blue in Figure 11-1).
- Down C-Tag MEPs facing the User port: These MEPs can be used to monitor the C-VLAN connections between the CPE and the 9145EMP.
- Up C-Tag MEPs, located on the user port (facing the VLAN multiplexing point): These MEPs are used to monitor C-VLAN connectivity from the 9145EMP towards the network core.

  For the 9145EMP, the SOAM frames initiated by those MEPs are immediately encapsulated in the S-VLAN tag corresponding to the MEP's C-Tag, as per VLAN multiplexing records. Hence, the SOAM frames are not visible inside the Provider network (unless the network is able to inspect double tagged SOAM frames); only the far-end demultiplexing point is able to process those frames.
- Up S-Tagged MEPs: These MEPs are monitoring the S-VLAN aggregation, which originates in the 9145EMP. The frames are single tagged (with a single S-Tag) when sent on the Network port.

  Logically, the up S-Tag MEPs are attached to the virtual C-S connector port, which is a proxy on the S component, for the User port. Hence, the SOAM frames issued by those MEPs have the MAC address of the corresponding User port. Interface Status TLV for the CCM frames issued by those MEPs carry the operational state of the User port. The corresponding User port (for an S-Tagged MEP) is determined based on the VLAN multiplexing record configuration.

There are no up MEPs on the Network side, as there no domain starting towards the User ports.

MIPs can be located only on C-VLANs, on the User port. The S-VLAN domain starts in the 9145E device, so there is no need for an intermediate monitoring port.

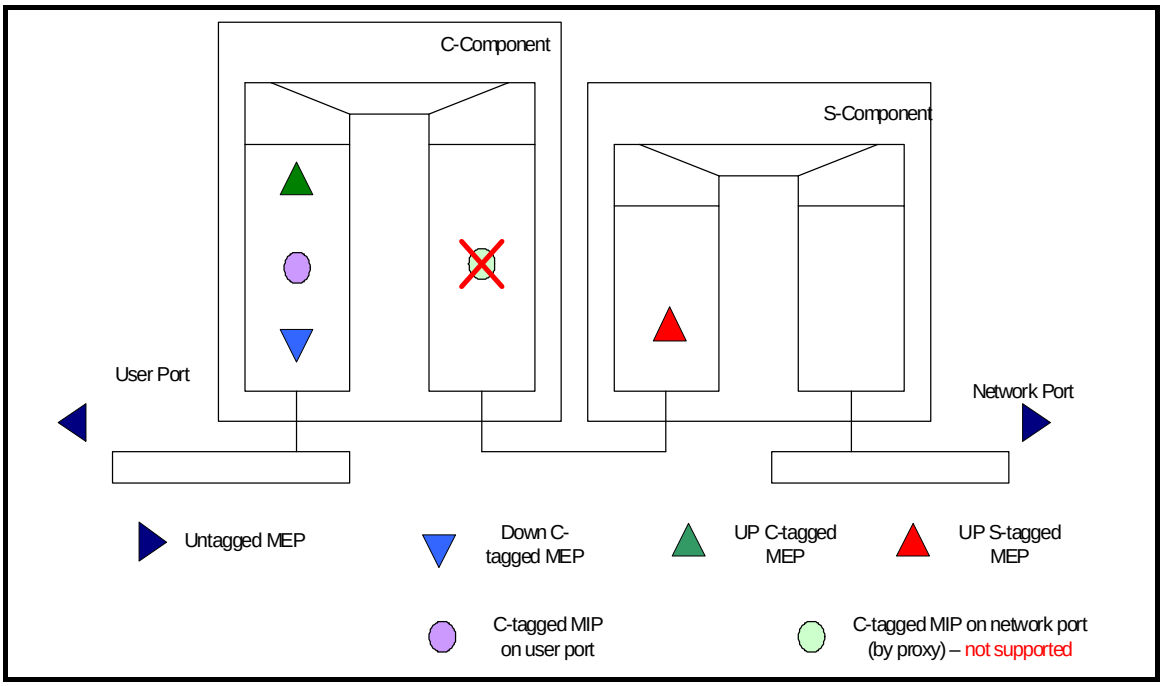

Figure 11-1 Positioning of up/down MEPs

11.1.3 SOAM Protocols

SOAM Connectivity Fault Management provides the following protocols:

- **Continuity Check Protocol**: The continuity check message (CCM) is used to detect connectivity failures in an MA/MEG. Each MEP can be configured to periodically transmit a CCM. CCMs are sent to all MEPs associated with a given MA/MEG. Use of a multicast destination address allows the discovery of remote MEP MAC addresses and the detection of leaks between MAs/MEGs. Every active MEP maintains a CCM database. As a MEP receives CCMs, it updates the record in the database. If no CCM frames from a peer MEP are received within the defined interval (3.5 times the CCM transmission period), loss of continuity defect is detected.

- **Loopback Protocols**: A loopback message (LBM) is used to identify the specific fault location. The MEP generates a loopback message addressed to a specific maintenance point within an MA/MEG. The destination MIP or MEP must respond with a loopback reply (LBR).

  A single, multicast LBM can be generated by a Y.1731 MEP, and every far-end MEP in the MA/MEG responds with a loopback reply; hence, the originating MEP will know all the far end MEPs that have connectivity.

  A sweep loopback procedure is used to detect the maximum transmission unit (MTU) size for a given end-to-end connection. Loopback messages are sent continuously, incrementing the MTU size for each new request (by increasing the size of the data type-

length-value (TLV) component). The network will drop frames above a certain unsupported MTU, hence the originating MEP will not receive the expected responses.

- **Linktrace Protocol**: The linktrace message (LTM) traces the path from a source MEP to a destination MP in the same MA or MEG. All intermediate MIPs respond with a linktrace reply (LTR) to the source MEP. Only the MIPs in the path between the source and destination will respond. LTM procedures are executed on demand and are initiated by administrators.

- **Alarm Indication Signal (AIS)**: AIS is a fault isolation method, applicable only to Y.1731 procedures. Using AIS messages, a lower level domain notifies a higher level domain of connectivity errors detected at that particular lower level. Upon detecting an AIS message, a higher level MEP will suppress all other defects detected at its level; the AIS indicates that there is a defect at an underlaying level, hence that defect has to be solved first.

- **Remote Defect Indication (RDI)**: A MEP can indicate to its peers, through an RDI flag, that it has encountered a defect, either local or remote. This information is advertised via CCM messages to all MEPs in the MA/MEG. The RDI flag is set for as long as the error condition is active.

The differences between 802.1ag and Y.1731 SOAM protocol support are shown in Table 11-1.

Feature		802.1ag	Y.1731
	Continuity check	Yes	Yes
Connectivity Fault Management	Loopback Unicast Multicast Sweep	 Yes N/A Yes	 Yes Yes Yes
	Linktrace	Yes	Yes
	AIS	N/A	Yes
	RDI	Yes	Yes

Table 11-1. SOAM protocol support for 802.1ag and Y.1731

11.1.4 Optional SOAM Configuration

SOAM can be configured to send additional informations about the 9145EMP NID, using Sender ID TLVs and/or Port ID TLVs.

Sender ID TLVs are optional extensions to SOAM packets, used to carry identification information about the system that originates a particular packet. The system may be identified using a textual string or a MAC or IP address associated with the NID. Details about Sender ID TLV configuration are described in section 11.2

Sender ID TLVs may be included, based on configuration, in CCM, LBM, and LTM packets. The far end system, upon receiving a packet containing a Sender ID TLV, parses and displays this information, which better identifies a particular node. The 9145EMP NID displays the content of the Sender ID TLVs received from far end system in the Connectivity Check Database (see section 11.6.5).

Port ID TLVs are optionally used for Linktrace reply messages, to identify a particular port on a given system. Port ID TLVs received from the far end are displayed in the Linktrace monitoring screen (see section 11.6.6.2).

11.1.5 Typical Service OAM Deployment and Applications

The application shown in Figure 11-2 is an example of a service provider network consisting of two Metro Ethernet Networks (MEN), MENA and MENB, interconnected at an NNI interface. The 9145EMP, located in the customer premises, provides the demarcation between the customer and the service provider networks. When SOAM fault monitoring is used, the network can be portioned into multiple hierarchical domains that allow better isolation of faults in the network. Every domain has some administrative boundaries.

For example the topology described in Figure 11-2 contains four hierarchical domains. At the lowest level (MD1) three distinct domains are monitoring point-to-point UNI and NNI links. Two Level 4 domains (MD4), MEN A and MEN B, are monitoring the end-to-end connectivity inside each Metro Ethernet Network in the topology. The service provider monitors its end-to-end service via a level 5 domain (MD5), while the subscriber uses a level 6 domain for customer-level monitoring.

The SOAM levels used by different organizations are decided based on administrative recommendations.

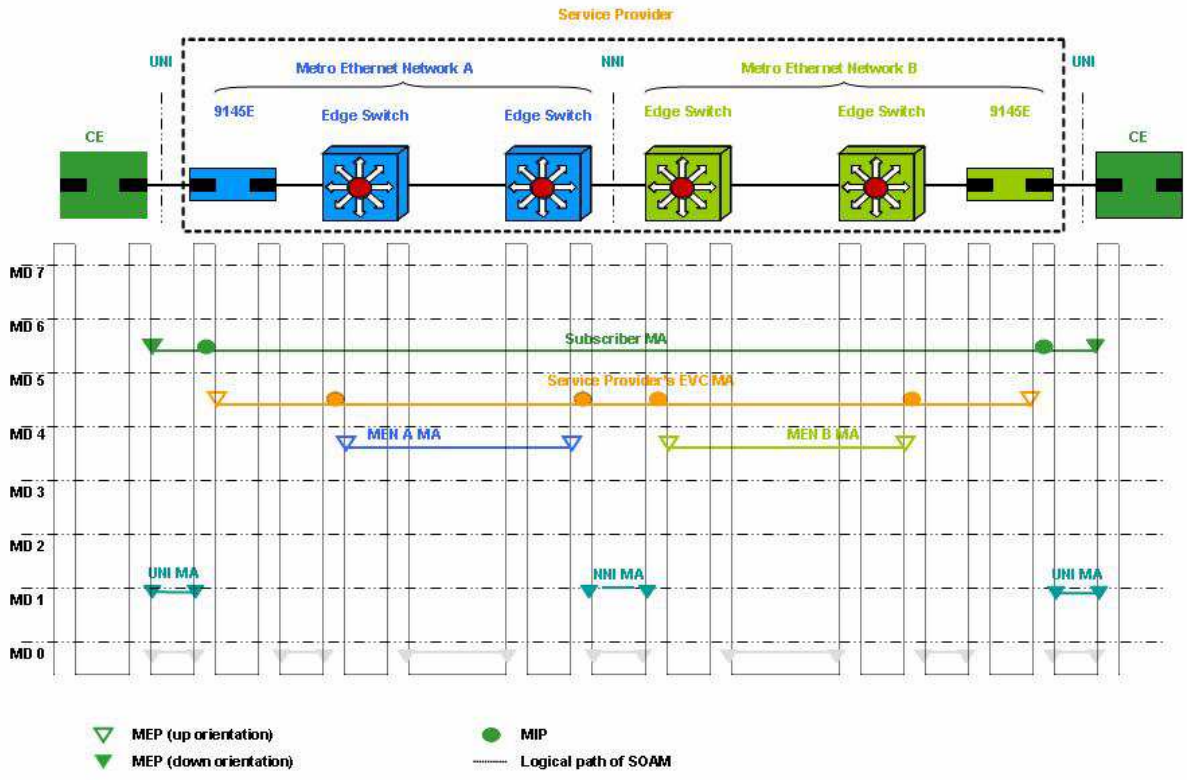

Figure 11-2 Typical Service OAM deployment and applications

11.1.6 Typical Configuration Sequence

The SOAM entities described in section 11.1.1 are creatable entities; they do not exist in the system when the system starts with the factory defaults. You must explicitly create those entities in the system using the screens and procedures described in this chapter.

The process of creating a new entity in the system includes a validation phase. The validation phase starts when the (A)dd command is issued. For each newly created entity, all attributes specified by the user are validated for value (the expected ranges) and consistency (that is, consistency among the parameters of the same entity and with the existing system configuration). If the validation fails, the entity is not created until the user corrects the validation error and a new (A)dd command is issued.

The SOAM configuration model defines the hierarchical relationship between MDs, MAs, MEPs, and MIPs. An MA is always attached to a particular existing MD, and may be attached to a particular VLAN multiplexing record; a MEP is attached to an MA or a MEG, and so on. When you configure SOAM entities, you must therefore follow a certain sequence:

1. Configure the proper VLAN Multiplexing records, as shown in Chapter 12 of this manual. A VLAN multiplexing record cannot be deleted or modified if SOAM entities are connected on it.

2. Configure the MD entities first. Up to eight MDs can be configured in a 9145EMP NID, using the procedures described in section 11.3.

3. Configure the MA and MEG entities. A MA/MEG must be associated with an underlaying VLAN Multiplexing record, with the exception of untagged MEGs/MAs. Choose the proper VLAN type (C-Tag or S-Tag) when you create the MAs and MEGs.

   If the VLAN type is S, then the VLAN list must contain only one element, which is the S-Tag value of the corresponding VLAN Multiplexing record.

   If the VLAN type is C, the VLAN list must contain only VLAN IDs that are included in C-VLAN list of the corresponding VLAN Multiplexing record. The list of VLANs associated with an CType MA or MEG can be changed runtime; however all VLANs must be included in the C-VLAN list of the VLAN multiplexing record

4. Configure the MEPs. Each MEP is associated with an existing MA or MEG, created in step 2.

5. Create the MIP entities. A MIP is associated with an MD (for 802.1ag MIPs) or with a MEG (for Y.1731 MIPs).

6. If required, configure the AIS client server relationships, as described in section 11.9. The AIS client server relationships are established between the MEPs and MIPs configured in the previous steps.

At runtime, deleting a lower level entity (such as a MA or a MEG) will automatically delete all higher level entities and relationships that are attached to the deleted object. For example, deleting an MD will automatically delete the MAs attached to the MD, as well as all MEPs, MIPs, and AIS associations related to the deleted MD. VLAN Multiplexing records associated with MAs or MEGs cannot be deleted while the MA is still configured.

11.1.6 Screen Navigation

SOAM parameters and procedures are configured using the menus described in this chapter. The menu hierarchy for SOAM is illustrated in Figure 11-3.

To select an item on a screen, type the number of the item and press **Enter**. The setting will be highlighted. To toggle between values within that item, use the Space bar.

If there is more than one page, the screen will offer the option of using `(F)irst, (P)rev, (N)ext, and (L)ast` to navigate. Press **Esc** to return to a previous screen.

All screens that show existing objects are refreshed automatically every 5 seconds; items that are being modified are not refreshed.

In Figure 11-3, some screens (MDs, MAs, MEPs and MIPs) are highlighted with a blue rectangle. For these entities, actions (display entities, create new entity, edit attributes) are executed in separate screens.

.

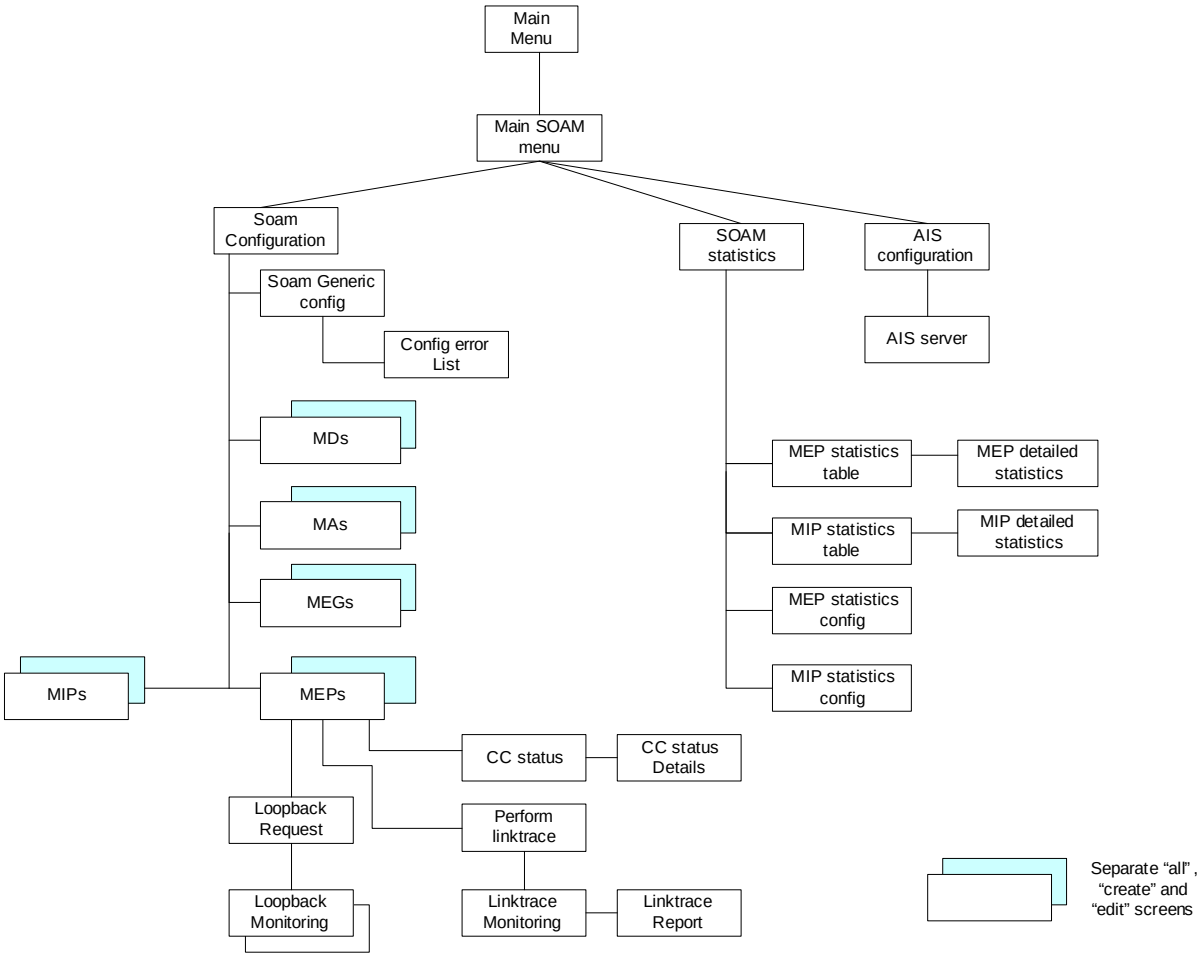

Figure 11-3 SOAM menu hierarchy

11.2 SOAM Configuration

Use the following steps to navigate to the SOAM System Level Configuration screen so that you can start to configure CFM.

1. On the Main Menu (Figure 11-4), type 11 and press **Enter.** The Service OAM Main Menu (Figure 11-5) opens.
2. On the Service OAM Main Menu (Figure 11-5), type 1 and press **Enter**. The SOAM Configuration screen (Figure 11-6) opens.
3. On the SOAM Configuration screen (Figure 11-6), type 1 and press **Enter**. The SOAM System Level Configuration screen (Figure 11-7) opens.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
----------------------------------MAIN MENU-----------------------------------


                              1) System Configuration
                              2) Diagnostics
                              3) Port Information
                              4) System Alarms
                              5) System Log
                              6) Utilities
                              7) Software Upgrade
                              8) Manage Logged In Users
                              9) Link OAM
                             10) CoS Configuration
                             11) Service OAM
                             12) VLAN Multiplexing
                             13) Logout

                              Select [113]:
```

Figure 11-4 Main Menu

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:12:36
--------------------------SERVICE OAM MAIN MENU-------------------------------


                             1) SOAM Configuration
                             2) SOAM Statistics

                             3) AIS Configuration




                                Select [1-3]:




-----------------------------------Messages-----------------------------------
```

Figure 11-5 Service OAM Main Menu

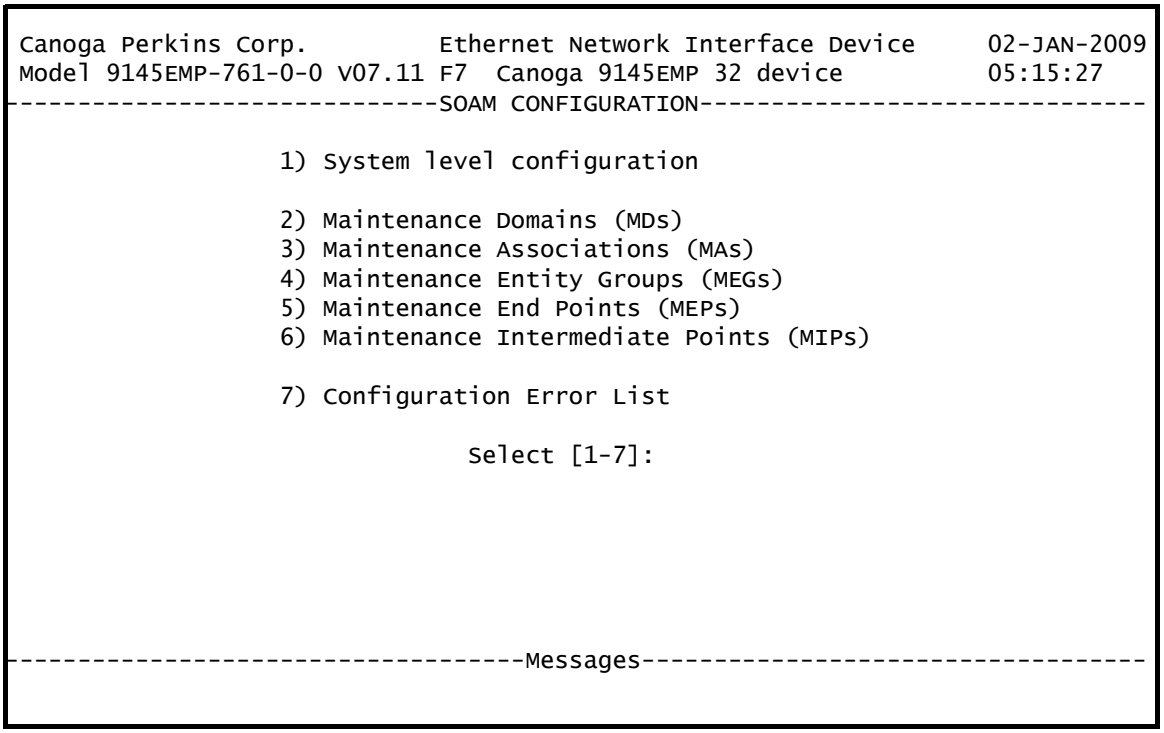
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
SOAM CONFIGURATION
1) System level configuration
2) Maintenance Domains (MDs)
3) Maintenance Associations (MAs)
4) Maintenance Entity Groups (MEGs)
5) Maintenance End Points (MEPs)
6) Maintenance Intermediate Points (MIPs)
7) Configuration Error List
Select [1-7]:
Messages

Figure 11-6 SOAM Configuration

NOTE: You can perform system-level configuration before or after you configure Maintenance Domains or other entities.

4. On the SOAM System Level Configuration screen (Figure 11-7), type 1 and press **Enter**.
5. Use the Space bar to select Enabled or Disabled and press **Enter**. If Service OAM procedures are disabled for the system, no Service OAM packets are captured and processed. Instead, all Service OAM packets received by the 9145EMP NID are transparently forwarded, using the same rules as for data plane traffic.
6. To select a Chassis ID Format, type 2 and press **Enter**. Select one of the following settings:
    - MAC Address, and press **Enter**. The Chassis ID value is read only. You cannot change the value on this screen.
    - Network Address, and press **Enter**. The Network Address value is read only. You cannot change the value on this screen.
    - Locally Assigned, and press **Enter**. This selection allows you to enter a custom string.

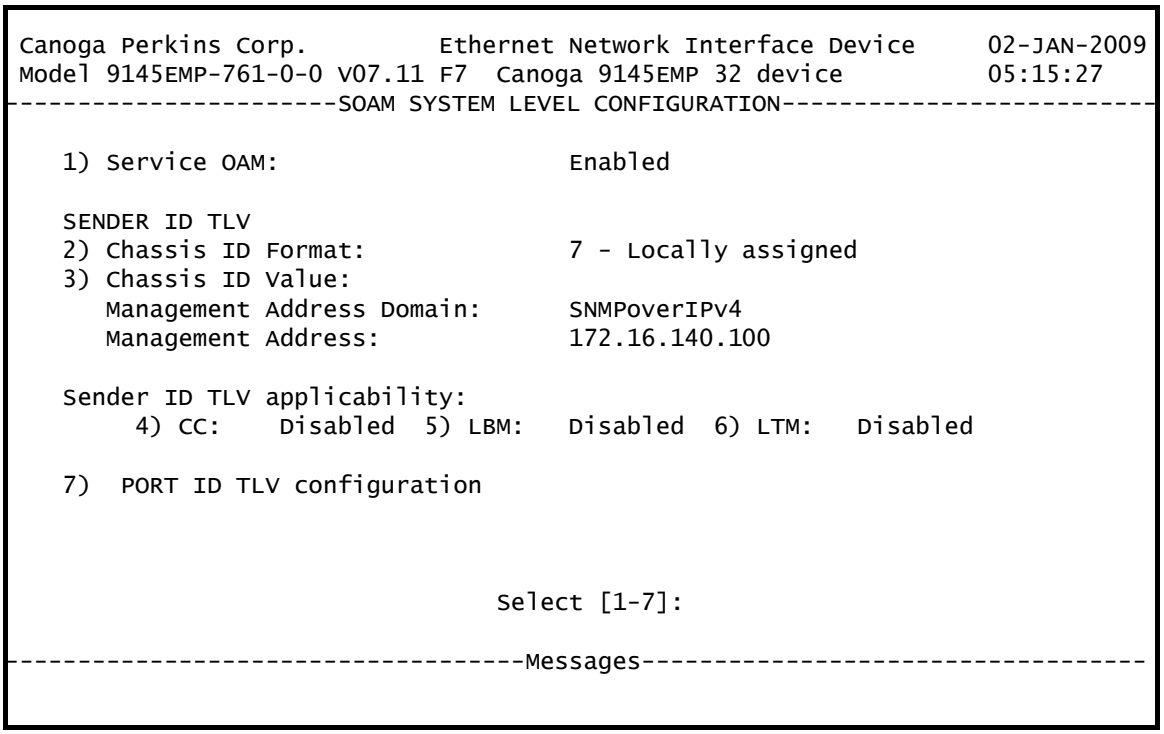
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
SOAM SYSTEM LEVEL CONFIGURATION
1) Service OAM: Enabled
SENDER ID TLV
2) Chassis ID Format: 7 - Locally assigned
3) Chassis ID Value:
Management Address Domain: SNMPoverIPv4
Management Address: 172.16.140.100
Sender ID TLV applicability:
4) CC: Disabled 5) LBM: Disabled 6) LTM: Disabled
7) PORT ID TLV configuration
Select [1-7]:
Messages

Figure 11-7 SOAM System Level Configuration screen

7. If you chose Locally Assigned in step 4, type 3 and press **Enter**. The Chassis ID Value field is highlighted.
8. Enter string in the Chassis ID Value field and press **Enter**.
9. To enable Sender ID TLV to be sent for connectivity check (CC) messages, type 4 and press **Enter**. Select Enabled or Disabled and press **Enter**.
10. To enable Sender ID TLV to be sent for loopback messages (LBM), type 5 and press **Enter**. Select Enabled or Disabled and press **Enter**.
11. To enable Sender ID TLV to be sent for a linktrace message (LTM), type 6 and press **Enter**. Select Enabled or Disabled and press **Enter**.

12. To change the Port ID TLV Type for the User port, type 7 and press **Enter**. The Port ID TLV screen (Figure 11-8) opens.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
----------------------PORT ID TLV CONFIGURATION---------------------------------

      PORT  Type:                                    Value:

      USER PORT 1      1) 7 - Locally assigned      2)
      USER PORT 2      3) 0 - None                  4)
      USER PORT 3      5) 0 - None                  6)
      USER PORT 4      7) 7 - Locally assigned      8)
      NETWORK SIDE     9) 0 - None                 10)




                           Select [1-10] for attributes:

-----------------------------------Messages-------------------------------------
```

Figure 11-8 Port ID TLV screen

13. To change the Port ID TLV Type for a port, type the number associated with the port and press **Enter**. Select None, MAC Address, or Locally Assigned, and press **Enter**. If you select MAC Address, the value field is populated automatically.

14. Type A to accept the new settings and press **Enter**.

15. Press **Esc** to return to the SOAM Configuration screen.

11.3 Maintenance Domains

Maintenance Domains (MDs) are applicable to 802.1ag procedures. They are the parts of the network for which faults in connectivity can be managed. The boundary of a Maintenance Domain is defined by a set of Domain Service Access Points (DoSAPs), each of which can become a point of connectivity to a service instance. Up to eight MDs can be configured in a 9145EMP NID. You can display, create, delete, and modify Maintenance Domains.

11.3.1 Display Maintenance Domains

To display a list of existing Maintenance Domains, on the SOAM Configuration screen (Figure 11-6), type 2 and press **Enter**. The Maintenance Domain List screen (Figure 11-9) opens.

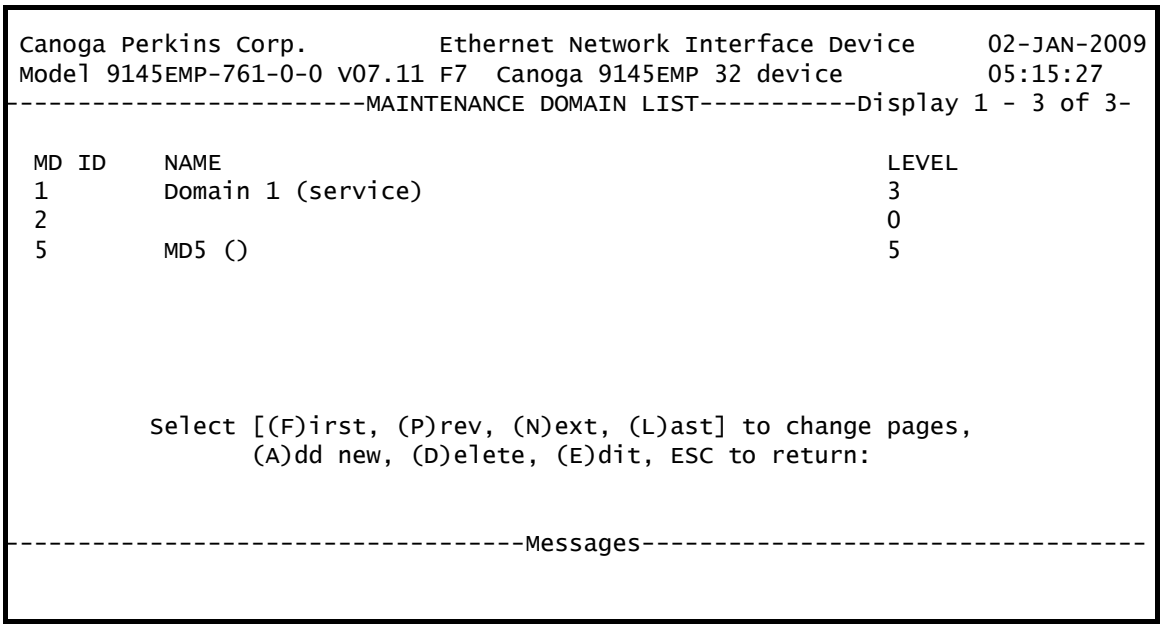
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
MAINTENANCE DOMAIN LIST
Display 1 - 3 of 3
MD ID NAME LEVEL
1 Domain 1 (service) 3
2 0
5 MD5 () 5
Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
(A)dd new, (D)elete, (E)dit, ESC to return:
Messages

Figure 11-9 Maintenance Domain List screen

11.3.2 Create a Maintenance Domain

1. On the Maintenance Domain List screen (Figure 11-9), type A and press **Enter**. The Create a New Maintenance Domain screen (Figure 11-10) opens. The first field, MD ID, is highlighted.

2. In the MD ID field, type a number between 1 and 65535 and press **Enter**. The Level field is highlighted.

3. In the Level field, type a number between 0 and 7. Higher numbers correspond to higher Maintenance Domains, those with the greatest physical reach; for example, the highest level corresponds to customers' CFM packets. Lower numbers correspond to lower Maintenance Domains, those with more limited physical reach; for example, MDs at level 0 usually cover single physical links. Press **Enter**. The Name Field is highlighted

4. In the Name field, type the name of the new domain and press **Enter**. (You can also configure an MD without a name. See, for example, MD ID 2 in Figure 11-9). The Permissions (Sender ID) field is highlighted.

5. In the Permissions (SenderID) field, select Chassis, Manage, ChassisManage, or None and press **Enter**. This value indicates what is to be included in the Sender ID TLV transmitted in CCMs, LBMs, LTMs, and LTRs:

    - None: The Sender ID TLV is not sent. This is the default value.
    - Chassis: the Chassis ID Length, Chassis ID Subtype, and Chassis ID fields of the Sender ID TLV are sent
    - Manage: the Management Address Length and Management Address of the Sender ID TLV are sent
    - ChassisManage: the The Chassis ID Length, Chassis ID Subtype, Chassis ID, Management Address Length and Management Address fields are sent.

    In order for a Sender ID TLV to be included in a packet, both Sender applicability attributes and Permissions attributes must be configured.

6. To accept the new Maintenance Domain settings, type A and press **Enter**. The Modify Maintenance Domain screen (Figure 11-11) opens.

7. To modify an attribute value, type the number of the attribute and press **Enter**, or press **Esc** to return to the Maintenance Domain List screen.

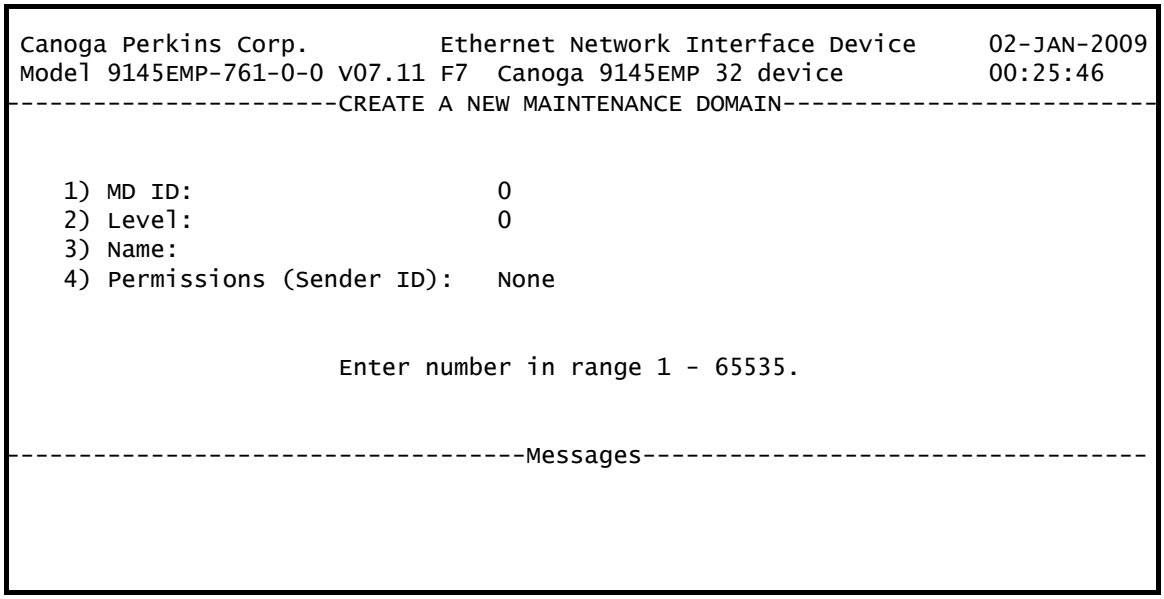
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:25:46
CREATE A NEW MAINTENANCE DOMAIN
1) MD ID: 0
2) Level: 0
3) Name:
4) Permissions (Sender ID): None
Enter number in range 1 - 65535.
Messages

Figure 11-10 Create a New Maintenance Domain screen

11.3.3 Delete a Maintenance Domain

When you delete a Maintenance Domain, all MAs and MEPs/MIPs associated with it are also deleted.

1. On the Maintenance Domain List screen (Figure 11-9), type D and press **Enter**. The current Maintenance Domain is highlighted.
2. Press the Space bar to scroll through the list and highlight the domain you wish to delete.
3. Press **Enter** to delete the highlighted domain. You are prompted to confirm the deletion.

11.3.4 Modify a Maintenance Domain

1. On the Maintenance Domain List screen (Figure 11-9), type E and press **Enter**. The current Maintenance Domain is highlighted.
2. Press the Space bar to scroll through the list and highlight the domain to modify.
3. When the item you want to modify is highlighted, press **Enter**. The Modify Maintenance Domain screen (Figure 11-11) opens.
4. To modify the Permissions (Sender ID) value, type 1 and select Chassis, Manage, ChassisManage, or None, and press **Enter**.
5. Type A and press **Enter** to accept the changes.
6. Press **Esc** to return to the Maintenance Domain List screen.

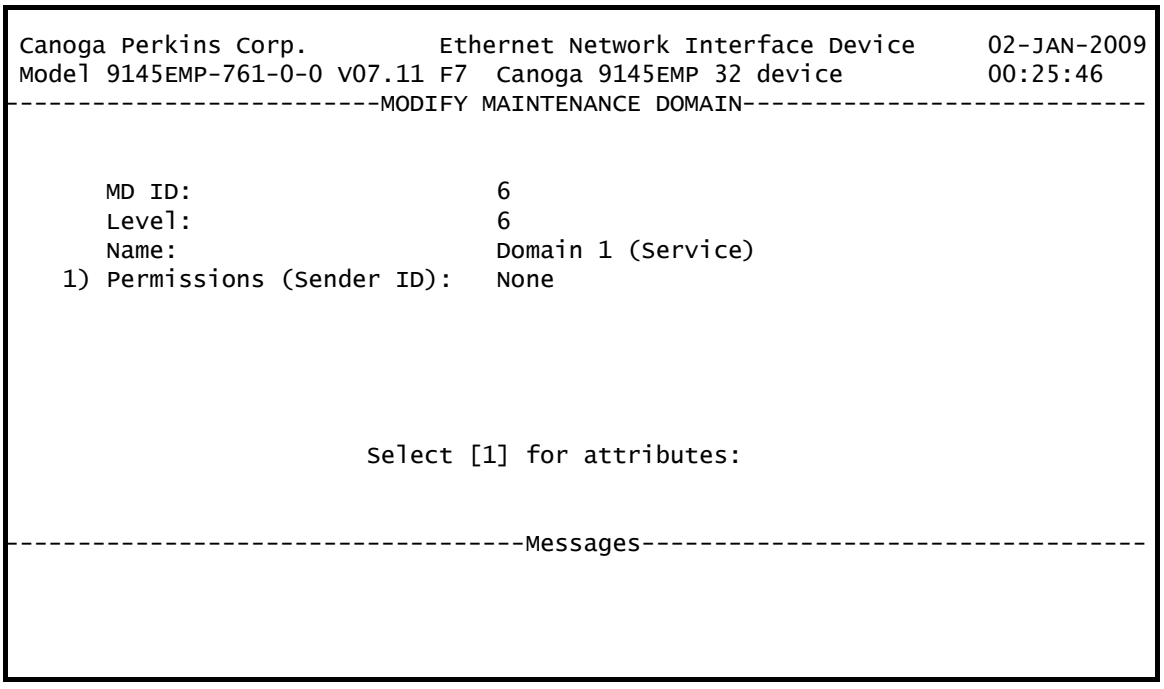
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 00:25:46
MODIFY MAINTENANCE DOMAIN
MD ID: 6
Level: 6
Name: Domain 1 (Service)
1) Permissions (Sender ID): None
Select [1] for attributes:
Messages

Figure 11-11 Modify Maintenance Domain screen

11.4 Maintenance Associations

Maintenance Associations (MAs) are applicable to 802.1ag procedures. An MA is a set of Maintenance Association End Points (MEPs), each configured with the same Maintenance Association Identifier (MAID) and MD Level, that verifies the integrity of a single service instance. Up to 256 MAs and MEGs can be configured in a 9145EMP NID.

11.4.1 Display Maintenance Associations

To display a list of existing Maintenance Associations, on the SOAM Configuration screen (Figure 11-6), type 3 and press **Enter**. The Maintenance Association List screen (Figure 11-12) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:25:46
------------------------MAINTENANCE ASSOCIATION LIST--------------------------

MA ID  LEV NAME                                              VLAN VLAN  VLAN
                                                             MUX  TYPE  LIST
26     1   NAMED MA                                          191  C-Tag 102
27     1   MA2_7                                             201  C-Tag 103
28     1   MA2_8                                             102  C-Tag 104, 105 ..
31     2   MA3_1                                             202  C-Tag 101
32     2   MA3_2                                             202  S-Tag 202
33     2   MA3_3                                             203  S-Tag 203
34     2   MA3_4                                             204  S-Tag 204
35     2   MA3_5                                             201  S-Tag 201
37     2   MA3_7                                             201  C-Tag 103
38     2   MA3_8                                             201  C-Tag 104
41     3   MA4_1                                             NONE None  N/A

         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                (A)dd new, (D)elete, (E)dit, ESC to return:

-----------------------------------Messages-----------------------------------
```

Figure 11-12 Maintenance Association List screen

11.4.2 Create a Maintenance Association

NOTE: Before you configure a new MA, the corresponding VLAN multiplexing record must already exist*.*

1. On the Maintenance Association List screen (Figure 11-12), type A and press **Enter**. The Create a New Maintenance Association screen (Figure 11-13) opens. The first field, MD ID, is highlighted.

2. Type an MD ID and press **Enter**. (To view a list of MDs, press **CTRL-L**, type S to select, and press **Enter**.) The MA ID field is highlighted. Each MA belongs to a single MD.

3. Type an MA ID and press **Enter**. The Name field is highlighted.

4. Type a name and press **Enter**. The VLAN Tag Type field is highlighted.
5. Select a VLAN Tag Type (NONE, C-Tag, or S-Tag).
    - None means that the frames are not tagged.
    - C-Tag indicates that ethernet frames (CCMs, LBMs, LBRs, LTMs, LTRs) are tagged for customers. C-Tagged MEPs or MIPs send and receive single or double tagged frames, depending on the position and configuration.
    - S-Tag indicates an Ethernet frame that is tagged according to the service provider's tagging scheme. An S-Tag is usually called also "outer tag" and it is identified as such by a different EthType, according to IEEE 802.1ad standard.

    Press **Enter**. If you selected C-Tag or S-Tag, the VLAN Multiplexing record field is highlighted.
6. If you selected C-Tag or S-Tag, type the number of the VLAN Multiplexing record and press **Enter**. The CCM Interval Field is highlighted.
7. Select a Continuity Check Message (CCM) Interval (1 sec, 10 sec, 100 ms). The CCM interval is the interval at which CCMs are sent by a MEP. Press **Enter**. The Permissions (Sender ID) field is highlighted
8. Select a Permissions (Sender ID) (Chassis, Manage, ChassisManage, Defer, None) and press **Enter**. This value indicates what is to be included in the Sender ID TLV transmitted in CCMs, LBMs, LTMs, and LTRs:
    - None: the Sender ID TLV is not sent. This is the default value.
    - Chassis: the Chassis ID Length, Chassis ID Subtype, and Chassis ID fields of the Sender ID TLV are sent.
    - Manage: the Management Address Length and Management Address of the Sender ID TLV are sent.
    - ChassisManage: the The Chassis ID Length, Chassis ID Subtype, Chassis ID, Management Address Length and Management Address fields are sent.
    - Defer: the contents of the Sender ID TLV is determined by the corresponding Maintenance Domain configuration.
9. To accept the new Maintenance Association settings, type A and press **Enter**. The Maintenance Association Attributes screen (Figure 11-14) opens.

10. To modify an attribute value, type the number of the attribute and press **Enter**, or press **Esc** to return to the Maintenance Association list.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:25:46
------------------------CREATE A NEW MAINTENANCE ASSOCIATION---------Display 1

   1) MD ID:                      0
   2) MA ID:                      0
   3) Name:

   4) VLAN Tag Type:              S-TAG
   5) VLAN Multiplexing record    281

   6) CCM Interval:               1 sec
   7) Permissions (Sender ID):    None



                  Select [1-7] for attributes

-----------------------------------Messages-----------------------------------
```

Figure 11-13 Create a New Maintenance Association screen

11.4.3 Delete a Maintenance Association

When you delete a Maintenance Association, all MEPs/MIPs associated with it are also deleted. A VLAN Multiplexing record cannot be deleted if it has a MA or a MEG associated with it.

1. On the Maintenance Association List screen (Figure 11-12), type D and press **Enter**. The current Maintenance Association is highlighted.

2. Press the Space bar to scroll through the list and highlight the Maintenance Association you wish to delete.

3. Press **Enter** to delete the highlighted Maintenance Association. You are prompted to confirm the deletion.

11.4.4 Modify a Maintenance Association

1. On the Maintenance Association List screen (Figure 11-12), type E and press **Enter**. The current MA is highlighted.

2. Press the Space bar to scroll through the Maintenance Associations and highlight an MA to modify.

3. When the item you want to modify is highlighted, press **Enter**. The Maintenance Associations Attributes screen (Figure 11-14) opens.

4. To change the CCM interval, type 1 and press **Enter**. The CCM interval is the interval at which CCMs are sent by a MEP. Select 1 sec, 10 sec, or 100 ms, and press **Enter**.

NOTE: No more than two MEPs at 100msec are supported. Typically, these MEPs are used at MD level 0 to monitor the physical link.

5. To add a VLAN to the VLAN list of this MA, type 2 and press **Enter**. You are prompted to type a new VLAN ID. Type the VLAN ID and press **Enter**. The VLAN appears in the list. Up to four VLANs can be added for each MA.
6. To remove a VLAN from the list, type 3 and press **Enter**. You are prompted to type the number of the VLAN to remove. Type the VLAN number and press **Enter**. Some restrictions apply to modifying and deleting VLANs:
    - The first VLAN is the primary VLAN and cannot be modified.
    - To delete the primary VLAN, you must delete *all* VLANs in the list and create a new list.
    - If a VLAN list is shared by two or more MAs/MEGs, it cannot be modified from this user interface.
7. You can view or modify the peer MEPs list. Type 4 and press **Enter**. The Maintenance Associations Peer MEPs screen opens. Up to 128 peer MEPs can be configured for an MA or a MEG. The maximum number of peer MEPs per system is 256.
    - To add a peer MEP, type 1 and press **Enter**. You are prompted for the MEP ID number. Type the number and press **Enter**.
    - To remove a peer MEP, type 2 and press **Enter**. You are prompted for the MEP ID number. Type the number and press **Enter**.
    - When all the peer MEPs have been configured, type A to accept and press **Enter**.
    - Press **Esc** to return to the Maintenance Associations Attributes screen
8. You can change the Permissions (Sender ID). Type 5 and press **Enter**. Select None, Chassis, Manage, ChassisManage, or Defer, and press **Enter**.
9. When you are finished, type A to accept the settings and press **Enter**.
10. Press **Esc** to return to the Maintenance Association List screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:25:46

---------------------MAINTENANCE ASSOCIATION ATTRIBUTES----------------------

      MD ID: 2          Level:    0
      MA ID: 2          Name:     port-layer

   1) CCM Interval:                   1 sec

      VLAN Tag Type:                  NONE
      VLAN Multiplexing record.       0
      VLAN List:                      N/A

   2) Add VLAN to VLAN List.
   3) Remove VLAN from VLAN List.

   4) View/Modify Peer MEPs list.

   5) Permissions (Sender ID):        None

                        Select [1-6] for attributes:

-----------------------------------Messages---------------------------------
```

Figure 11-14 Maintenance Association Attributes screen

11.5 Maintenance Entity Groups

Maintenance Entity Groups (MEGs) are specific to Y.1731 SOAM procedures. A MEG consists of the maintenance entities that belong to the same service inside a common SOAM domain. Up to 256 MEGs can be configured in a 9145EMP NID.

11.5.1 Display Maintenance Entity Groups

To display a list of existing Maintenance Entity Groups, on the SOAM Configuration screen (Figure 11-6), type 4 and press **Enter**. The Maintenance Entity Group List screen (Figure 11-15) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27
-----------------------MAINTENANCE ENTITY GROUP LIST--------Display 1 - 2 of 2-

MEG ID   Level  MEG Name           VLAN   VLAN   VLAN
                                    MUX   TYPE   LIST
100       1   Provider1_MEG        NONE  None   N/A
200       2   Provider2_MEG        200   C-Tag  100, 101, 102 ..
300       3   Provider3_MEG        200   S-Tag  200
...









         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                (A)dd new, (D)elete, (E)dit, ESC to return:


-----------------------------------Messages-----------------------------------
```

Figure 11-15 Maintenance Entity Group List screen

11.5.2 Create a Maintenance Entity Group

1. On the Maintenance Entity Group List screen (Figure 11-15), type A and press **Enter**. The Create a New Maintenance Entity Group screen (Figure 11-22) opens. The first field, MEG ID, is highlighted.

2. Type a MEG ID and press **Enter**. The Level field is highlighted.

3. In the Level field, type a number between 0 and 7. Higher numbers correspond to higher Maintenance Domains, that is, those with the greatest physical reach, with the highest values for customers' CFM packets. Lower numbers correspond to lower Maintenance Domains, those with more limited physical reach, with the lowest values for CFM PDUs protecting single bridges or physical links. Press **Enter**. The Name field is highlighted.

4. Type a Name for the Maintenance Entity group and press **Enter**. The VLAN Tag Type field is highlighted.

5. Select a VLAN Tag Type (NONE, C-Tag, or S-Tag).

    - None means that the frames are not tagged.
    - C-Tag indicates that ethernet frames (CCMs, LBMs, LBRs, LTMs, LTRs) are tagged for customers. C-Tagged MEPs or MIPs send and receive single or double tagged frames, depending on the position and configuration.
    - S-Tag indicates an Ethernet frame that is tagged according to the service provider's tagging scheme. An S-Tag is usually called also "outer tag" and it is identified as such by a different EthType, according to IEEE 802.1ad standard.

    Press **Enter**. If you selected C-Tag or S-Tag, the VLAN Multiplexing record field is highlighted.

6. If you selected C-Tag or S-Tag, type the number of the VLAN Multiplexing record and press **Enter**. The CCM Interval Field is highlighted.

7. Select a Continuity Check Message (CCM) Interval (1 sec, 10 sec, 100 ms) and press **Enter**. The CCM interval is the interval at which CCMs are sent by a MEP. The Permissions (Sender ID) field is highlighted

8. In the Permissions (SenderID) field, select None, Chassis, Manage, or ChassisManage and press **Enter**. This value indicates what is to be included in the Sender ID TLV transmitted in CCMs, LBMs, LTMs, and LTRs:

    - None: The Sender ID TLV is not sent. This is the default value.
    - Chassis: the Chassis ID Length, Chassis ID Subtype, and Chassis ID fields of the Sender ID TLV are sent.
    - Manage: the Management Address Length and Management Address of the Sender ID TLV are sent.
    - ChassisManage: the The Chassis ID Length, Chassis ID Subtype, Chassis ID, Management Address Length and Management Address fields are sent.

9. To accept the new Maintenance Entity Group settings, type A and press **Enter**. The Maintenance Entity Group Attributes screen (Figure 11-16) opens.

10. To modify an attribute value, type the number of the attribute and press **Enter**, or press **Esc** to return to the Maintenance Entity Group List.

11.5.3 Delete a Maintenance Entity Group

When you delete a Maintenance Entity Group, all MEPs/MIPs associated with it are also deleted from the AIS client lists.

1. On the Maintenance Entity Group List screen (Figure 11-15), type D and press **Enter**. The current Maintenance Entity Group is highlighted.
2. Press the Space bar to scroll through the list and highlight the entry you wish to delete.
3. Press **Enter** to delete the highlighted Maintenance Entity Group. You are prompted to confirm the deletion.

11.5.4 Modify a Maintenance Entity Group

1. On the Maintenance Entity Group List screen (Figure 11-15), type E and press **Enter**. The current MEG is highlighted.
2. Press the Space bar to scroll through the Maintenance Entity Groups and highlight a MEG to modify.
3. When the item you want to modify is highlighted, press **Enter**. The Maintenance Entity Group Attributes screen (Figure 11-16) opens.
4. To change the CCM interval, type 1 and press **Enter**. The CCM interval is the interval at which CCMs are sent by a MEP. Select 1 sec, 10 sec, or 100 ms, and press **Enter**.

NOTE: No more than two MEPs at 100msec are supported. Typically, these MEPs are used at MEG level 0 to monitor the physical line.

5. To add a VLAN to the VLAN list of this MEG, type 2 and press **Enter**. You are prompted to type a new VLAN ID. Type the VLAN ID and press **Enter**. The VLAN appears in the list. Up to four VLANs can be added for each MA.
6. To remove a VLAN from the list, type 3 and press **Enter**. You are prompted to type the number of the VLAN to remove. Type the VLAN number and press **Enter**.

   Some restrictions apply to modifying and deleting VLANs:

   - The first VLAN is the primary VLAN and cannot be modified.
   - To delete the primary VLAN, you must delete *all* VLANs in the list and create a new list.
   - If a VLAN list is shared by two or more MAs/MEGs, it cannot be modified from this user interface.

7. You can view or modify the peer MEPs list. Type 4 and press **Enter**. The Maintenance Entity Group Peer MEPs screen opens.

   - To add a peer MEP, type 1 and press **Enter**. You are prompted for the MEP ID number. Type the number and press **Enter**.

- To remove a peer MEP, type 2 and press **Enter**. You are prompted for the MEP ID number. Type the number and press **Enter**.
- When all the peer MEPs have been configured, type A to accept and press **Enter**.
- Press **Esc** to return to the Maintenance Entity Group Attributes screen

8. You can change the Permissions (Sender ID). Type 5 and press **Enter**. Select None, Chassis, Manage, ChassisManage, or Defer, and press **Enter**.
9. When you are finished, type A to accept and press **Enter**.
10. Press **Esc** to return to the Maintenance Entity Group List screen.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V11.02 F11                                   00:11:01
--------------------MAINTENANCE ENTITY GROUP ATTRIBUTES-----------------------

      MEG ID:100  Name:          test-meg
                  Name Format:   ICC-based Format
                  Level:         2
   1) CCM Interval:                   1 sec

      VLAN Tag Type:                  C-Tag
      VLAN Multiplexing record.       100

      VLAN List:                      N/A

   2) Add VLAN to VLAN List.
   3) Remove VLAN from VLAN List.

   4) View/Modify Peer MEPs list.
   5) Permissions (Sender ID):        None

                        Select [1-6] for attributes:

-----------------------------------Messages---------------------------------
```

Figure 11-16 Maintenance Entity Group Attributes screen

11.6 Maintenance End Points

A Maintenance Association End Point (MEP) is an actively managed CFM entity that can generate and receive CFM PDUs and track any responses. Up to 256 MEPs can be configured in a 9145EMP NID device. For more information, see the section "Logical Positioning of MEPs and MIPs" on page 125.

11.6.1 Display Maintenance End Points

To display a list of existing MEPs, on the SOAM Configuration screen (Figure 11-6), type 5 and press **Enter**. The Maintenance End Point List screen (Figure 11-17) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27

-------------------------MAINTENANCE END POINT LIST---------Display 1 - 4 of 4-

MA/MEG    MEP ID  LEVEL     PORT      DIRECTION VLAN LIST
26        1026    1         USR1      UP        102
27        1027    1         USR2      UP        103
28        1028    1         USR3      UP        104
31        1031    2         NET1      DOWN      101
32        1032    2         NET1      DOWN      102
33        1033    2         NET1      DOWN      103
34        1034    2         NET1      DOWN      104
35        1035    2         USR4      UP        101
36        1036    2         USR4      UP        102
37        1037    2         USR4      UP        103
38        1038    2         USR4      UP        104
41        1041    3         NET1      DOWN      101
42        1042    3         NET1      DOWN      102

         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
         (A)dd new, (D)elete, (E)dit, CC Data(B)ase, ESC to return:

-----------------------------------Messages-------------------------------------
```

Figure 11-17 Maintenance End Point List screen

11.6.2 Create a Maintenance End Point

NOTE: If LAG mode is enabled on the network side, then MEPs can be created only on the LAG, not on individual ports NET1 and NET2.

1. On the Maintenance End Point List screen (Figure 11-17), type A and press **Enter**. You are prompted to enter A for 802.1ag or Y for Y.1731.

2. Type A or Y and press **Enter**. The Create a New Maintenance End Point screen (Figure 11-18 for 802.1ag or Figure 11-19 for Y.1731) opens. The first field, MA ID (for 802.1ag) or MEG ID (for Y.1731), is highlighted.

3. Type an MA ID or MEG ID and press **Enter**. (To view a list of MA/MEGs, press **CTRL-L**, type S to select, and press **Enter**.) The MEP ID field is highlighted.

4. Type a MEP ID and press **Enter**. The Admin Status field is highlighted.

5. In the Admin Status field, select Enabled or Disabled and press **Enter**. The Direction field is highlighted.

6. In the Direction field, select Up to identify a MEP that transmits CFM PDUs towards, and receives them from, the direction of NID interworking. Select Down to identify a MEP that receives CFM PDUs from, and transmits them towards, the direction of the wire. Press **Enter**. The Port field is highlighted.

7. In the Port field, select USR1, USR2, USR3, USR4, or NET1. (The list of accessible ports for the MEP will be dynamically filled depending on configuration of the appropriate MA/MEG.)

8. To accept the new Maintenance End Point settings, type A and press **Enter**. The Maintenance End Point Attributes screen (Figure 11-20 for 802.1ag or Figure 11-21 for Y.1731) opens.

9. To modify an attribute value, type the number of the attribute and press **Enter**, or press **Esc** to return to the Maintenance End Point List screen.

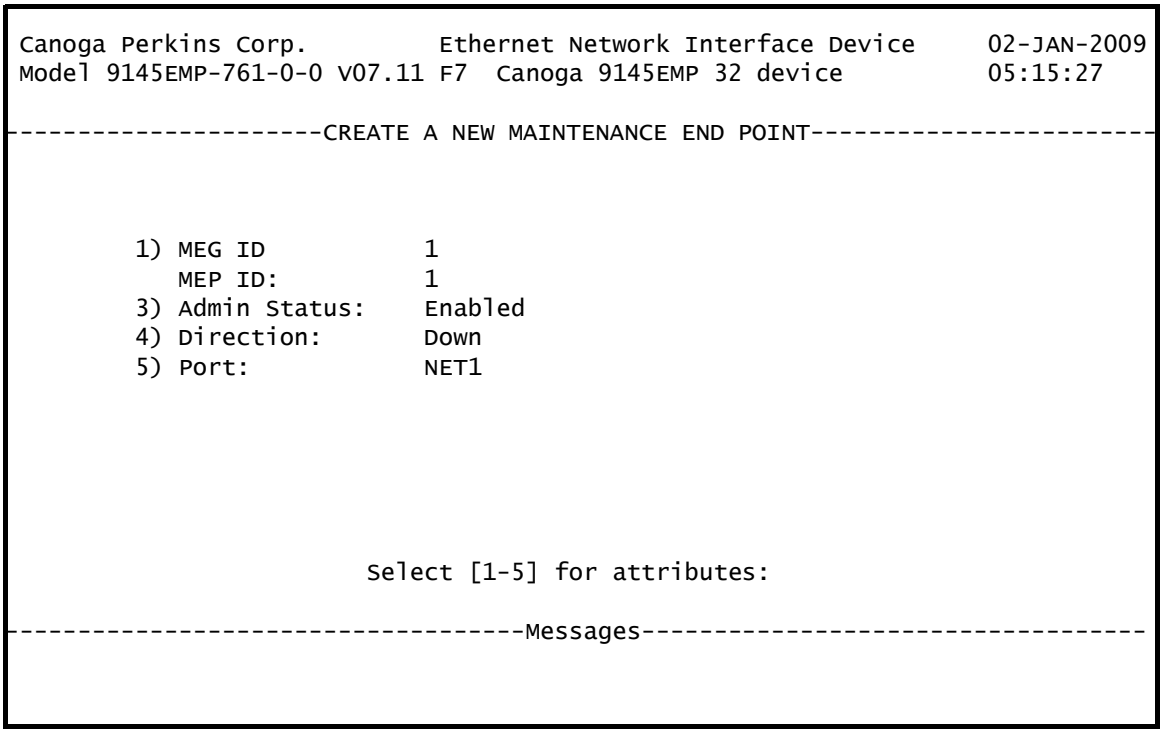
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
CREATE A NEW MAINTENANCE END POINT
1) MEG ID 1
MEP ID: 1
3) Admin Status: Enabled
4) Direction: Down
5) Port: NET1
Select [1-5] for attributes:
Messages

Figure 11-18 Create a New Maintenance End Point screen (for 802.1ag)

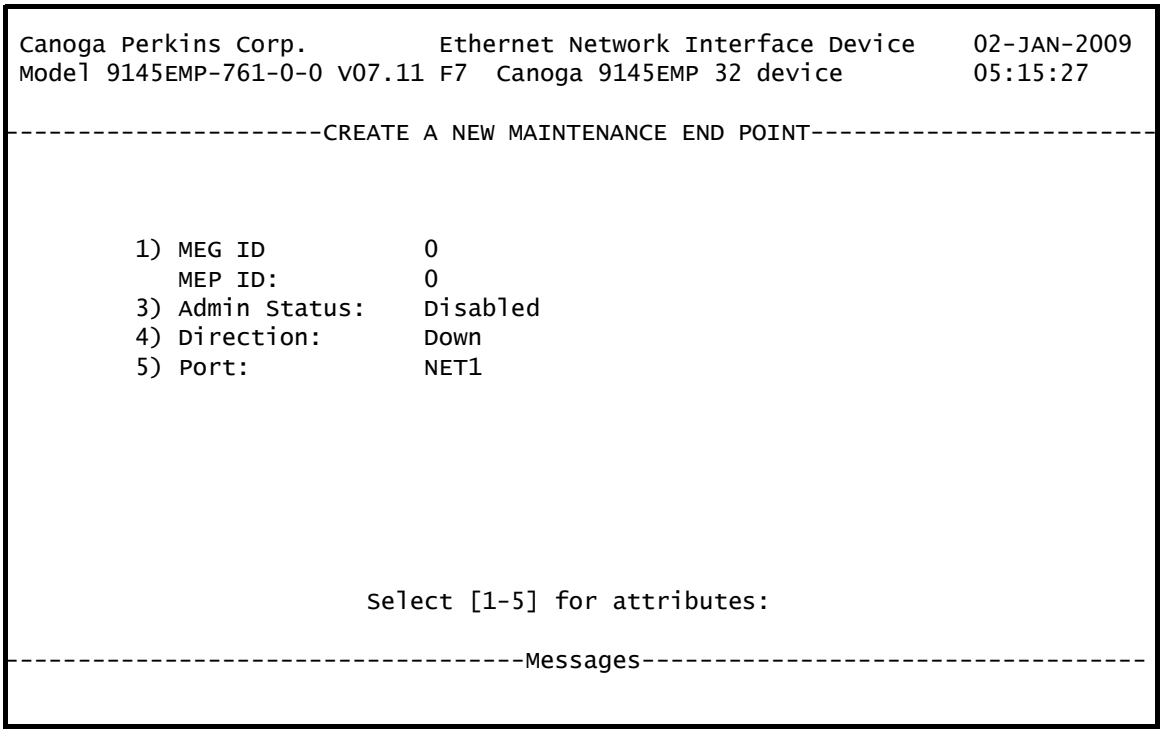
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
CREATE A NEW MAINTENANCE END POINT
1) MEG ID 0
MEP ID: 0
3) Admin Status: Disabled
4) Direction: Down
5) Port: NET1
Select [1-5] for attributes:
Messages

Figure 11-19 Create a New Maintenance End Point screen (Y.1731)

11.6.3 Delete a Maintenance End Point

When you delete a Y.1731 Maintenance End Point, it is also deleted from the AIS client list.

1. On the Maintenance End Point List screen (Figure 11-17), type D and press **Enter**. The current MEP is highlighted.
2. Press the Space bar to scroll through the list and highlight the entry you wish to delete.
3. Press **Enter** to delete the highlighted MEP.

11.6.4 Modify a Maintenance End Point

1. On the Maintenance End Point List screen (Figure 11-17), type E and press **Enter**. The current MEP is highlighted.
2. Press the Space bar to scroll through the list and highlight the entry to modify.
3. When the MEP you want to modify is highlighted, press **Enter**. The Maintenance End Point Attributes screen for that MEP opens (Figure 11-20 for 802.1ag or Figure 11-21 for Y.1731). The top of the screen displays the MEP attributes that you configured when the MEP was created.
4. To change the Admin Status, type 1 and press **Enter**. Select Enabled or Disabled and press **Enter**.

5. To change CCM Transmit Status, type 2 and press **Enter**. Select Enabled or Disabled and press **Enter**.

6. To change the Primary VLAN ID, type 3 and press **Enter**. Press the Space bar to select a VLAN ID to be used as the primary VLAN.

7. To change the fault alarm detect time, type 4 and press **Enter**. This is the time that defects must be present before a fault alarm is issued. Type an entry between 2500 and 10000 milliseconds and press **Enter**.

   When a defect is detected, a fault alarm is raised. When the defect is no longer present, the fault alarm is not cleared immediately. The system waits for the fault alarm clear time before clearing the alarm.

8. To change the fault alarm clear time, type 5 and press **Enter**. This is the time that defects must be absent before a fault alarm is reset. Type an entry between 2500 and 10000 milliseconds and press **Enter**.

9. To change the CCM/LTM Priority, type 6 and press **Enter**. This is the priority parameter (Pbits) for CCMs and LTMs transmitted by the MEP. Type a number from 0 to 7 and press **Enter**.

10. To change the lowest alarm priority, type 7 and press **Enter**. All defects with priority equal or higher than the one specified will generate an alarm. Select from the list of alarms (MacRemErrXcon, RemErrXcon, ErrXcon, Xcon, NoDefects, AllDefects) and press **Enter**. Beneath the configurable items on your screen is the following read only information:

    - Fault notification state: The current state of the Fault Notification State generator.
    - Defects: The current list of active defects.
    - Next Linktrace trans. ID: The transaction ID that will be used in the next Linktrace message.
    - Next Loopback trans. ID: The transaction ID that will be used in the next Loopback message.

11. If you are configuring a Y.1731 MEP, go to step 12. If you are configuring an 802.1ag MEP, type A to accept the settings and press **Enter**. Press **Esc** to return to the Maintenance End Point List screen. If you are modifying a Y.1731 MEP (Figure 11-21):

12. To change the AIS Transmit interval, type 8 and press **Enter**. Select 1 sec or 1 min and press **Enter**.

13. To change the AIS priority bits, type 9 and press **Enter**. Type a number from 0 to 7 and press **Enter**.

14. Press **Esc** to return to the Maintenance End Point List screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device    02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27

----------------------MAINTENANCE END POINT ATTRIBUTES-------------------------

   MEP ID: 1028     Direction: Up        Level: 1VLAN Type: C-VLAN
   MA  ID: 28       Port:      USR2      MAC:   00:40:2A:01:EE:23

   1) Admin status:                   Enabled
   2) CCM Transmit status:            Disabled
   3) Primary VLAN ID:                104
   4) Fault alarm Detect time:        2500
   5) Fault alarm clear time :        10000
   6) CCM/LTM Priority:               7
   7) Lowest alarm priority:          MacRemErrXcon
      Fault notification state:       Defect reported
      Defects:                        RemCCM
      Next Linktrace trans. ID: 1     Next Loopback trans. ID: 1

             Select [1-7], (T) for Linktrace, (L) for Loopback:

-----------------------------------Messages-----------------------------------
```

Figure 11-20 Maintenance End Point Attributes screen (802.1ag)

```
Canoga Perkins Corp.          Ethernet Network Interface Device    02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
----------------------MAINTENANCE END POINT ATTRIBUTES-------------------------
MEP ID: 1        Direction: Up        Level: 7
   MEG ID: 101      Port:      User      MAC:   00:40:2A:01:EE:23

   1) Admin status:                   Enabled
   2) CCM Transmit status:            Enabled
   3) Primary VLAN ID:                900
   4) Fault alarm Detect time:        2500
   5) Fault alarm clear time:        10000
   6) CCM/LTM Priority:               7
   7) Lowest alarm priority:          MacRemErrXcon A is
      Fault notification state:       Defect reported
      Defects:                        Random
      Next Linktrace trans. ID: 1     Next Loopback trans. ID: 2
   8) AIS Transmit interval:          1 sec
   9) AIS Priority bits:              1

             Select [1-9], (T) for Linktrace, (L) for Loopback:
-----------------------------------Messages-----------------------------------
```

Figure 11-21 Maintenance End Point Attributes screen (Y.1731)

11.6.5 Interoperability between a Y.1731 MEP and 802.1ag MEPs

In general, an 802.1ag MEP cannot interoperate correctly with a Y.1731 MEP; that is, they cannot correctly exchange CCM messages. Their respective standards do not provide compatibility methods.

The Canoga Perkins 9145EMP NID does, however, provide a configuration method that will allow interoperability between a Y.1731 MEP and an 802.1ag MEP operating in the same administrative domain at the same level.

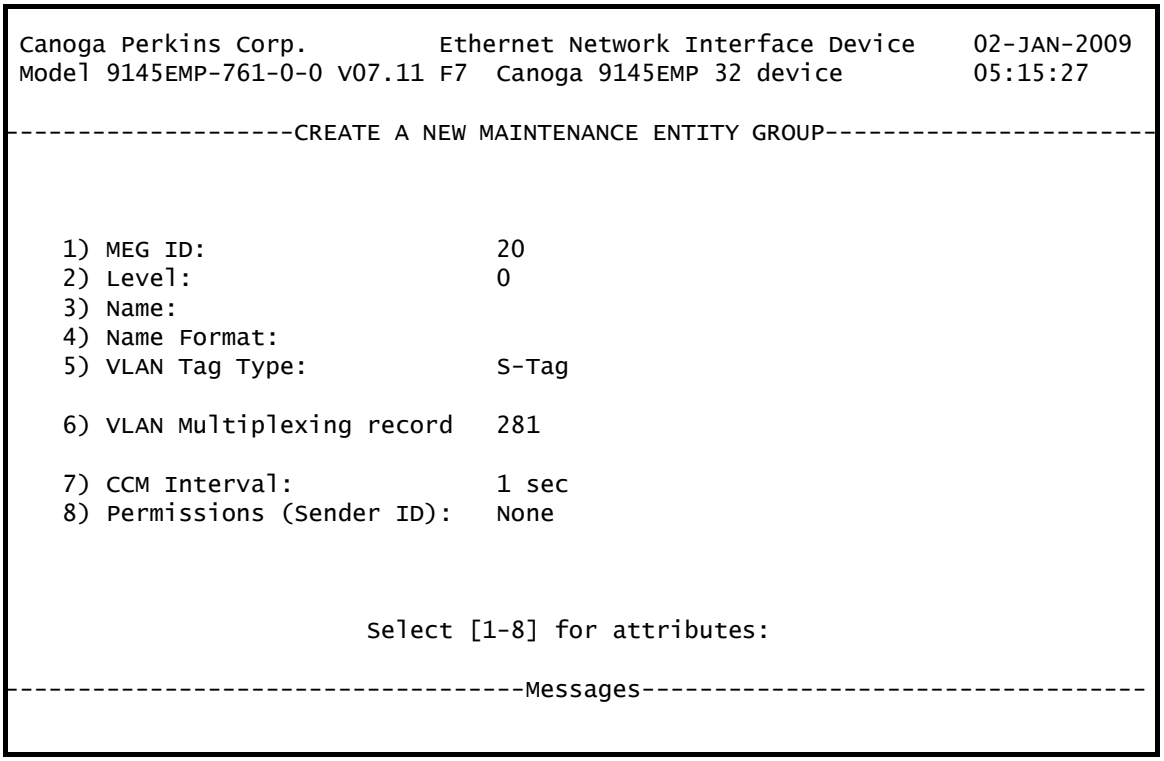
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
CREATE A NEW MAINTENANCE ENTITY GROUP
1) MEG ID: 20
2) Level: 0
3) Name:
4) Name Format:
5) VLAN Tag Type: S-Tag
6) VLAN Multiplexing record 281
7) CCM Interval: 1 sec
8) Permissions (Sender ID): None
Select [1-8] for attributes:
Messages

Figure 11-22 Create a New Maintenance Entity Group screen

To configure the operation of the MEPs in compatible mode, use the following steps:

1. For the 802.1ag MEP, configure the corresponding MD Domain Name as empty. Only the MA name will be transmitted in the CCM packet.

2. For the Y.1731 MEP, configure the corresponding MEG name in Character string mode. The MEG name configured for the Y.1731 MEP must match the name defined for the MA of the 802.1ag MEP.

11.6.6 View the Continuity Check Database for a Maintenance End Point

A MEP periodically transmits a continuity check message (CCM) to ensure connectivity over the MA to which it belongs. No reply is sent in response to receiving a CCM. The CCM provides a means to detect connectivity failures in an MA. A connectivity failure occurs if a MEP:

- is unable to receive for more than 3.5 transmission intervals a CCM from a peer MEP in its MA, indicating either a MEP failure or a network failure. This defect is identified as RemCCM.
- receives a CCM with an incorrect transmission interval or an incorrect MEP ID, indicating a configuration error. This defect is identified as ErrCCM.
- receives an AIS message indicating a defect at the underlying level. This defect is identified as AIS.
- receives a CCM with an incorrect MEP ID or MAID, indicating a configuration error or a cross connect error. This defect is identified as XCON.
- receives a CCM with an MD Level lower than that of the MEP, indicating a configuration error or a cross connect error.
- receives a CCM containing a Port Status TLV or Interface Status TLV indicating a failed bridge port or aggregated port on the far end. This defect is identified as MAC.

Every active MEP receives information about other MEPs in the Maintenance Association. The information is held in its MEP CCM Database. To view database entries:

- On the Maintenance End Point List screen (Figure 11-17), type B and press **Enter**. The current Maintenance End Point is highlighted.
- Press the Space bar to scroll through the list and highlight the entry to view.
- When the Maintenance End Point you want to view is highlighted, press **Enter**. The CCM Connectivity Monitoring screen for that MEP (Figure 11-23) opens.
- To view the details of the database entry, type D and press **Enter**. The CCM Connectivity Monitoring Details screen (Figure 11-24) opens.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27

------------------------CCM CONNECTIVITY MONITORING--------------------------

   MEP ID: 1013     Direction: Up        Level: 0 VLAN Type: None
   MA  ID: 13       Port:      NET2

   PEER ID             STATE     RDI BIT   PORT STATUS         IF STATUS
   2013                Failed    False     N/A                 N/A









         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                         (D)etails, ESC to return:

-----------------------------------Messages-------------------------------------
```

Figure 11-23 CCM Connectivity Monitoring screen

In the example shown in Figure 11-24, the connectivity check has failed.

- The remote peer MEP MAC address cannot be determined because it is not receiving CCMs from the remote peer MEP.
- The Port Status is N/A because the MEP is not receiving CCMs from the remote peer MEP. If the CC is successful, the Port Status displays the value of the Port Status TLV of the received CCM (Up, Blocked, etc.) If the far end does not include Port status TLVs in transmitted CCMs, the Port Status field will show N/A, even if the CCM procedure is successful.
- The Interface Status is N/A because the MEP is not receiving messages from the remote peer MEP. If the connectivity check is successful, the Interface Status displays the value of the Interface Status TLV of the received message (for example, Up).
- The timestamp represents the time when the last operational status change occurred for the monitored far end MEP.

Press **Esc** to return to the Maintenance End Point List screen.

.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27

-------------------------CCM CONNECTIVITY MONITORING DETAILS-------------------

   MEP ID: 1013     Direction: Up        Level: 0     VLAN Type: C-VLAN
   MA  ID: 13       Port:      NET1

   Remote MEP ID:           2013
   State:                   Failed
   TimeStamp:               5
   MAC:                     FF:FF:FF:FF:FF:FF
   RDI Bit:                 False
   Port Status:             N/A
   Interface Status:        N/A



         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                        (D)etails, ESC to return:

-----------------------------------Messages-------------------------------------
```

Figure 11-24 CCM Connectivity Monitoring Details screen

11.6.6 Linktrace Procedures

A Linktrace Message (LTM) is initiated by a MEP to trace a path to a target MAC address or MEP ID. It is forwarded from MIP to MIP, up to the point at which the LTM reaches its target, a MEP, or can no longer be forwarded. Each MEP or MIP along the path to the target generates a linktrace reply (LTR).

11.6.6.1 Initiating a Linktrace Request

You can initiate a link trace and monitor the results on a separate screen.

NOTE: Only one Linktrace session can be active at a time for the entire system.

1. On the Maintenance End Point Attributes screen (Figure 11-20 for 802.1ag or Figure 11-21 for Y.1731), type T and press **Enter**. If a linktrace request was already initiated from this MEP, the Linktrace Monitoring screen (Figure 11-26) opens. Otherwise, the Linktrace Request screen (Figure 11-25) opens.

2. To enter an address for the linktrace request, type 1 and press **Enter**. Select MAC address or MEP ID and press **Enter**. You are prompted to type the address or ID. Type a MAC address or MEP ID and press **Enter**.

3. To set the FDB only flag, type 2 and press **Enter**. If the FDB only flag is set to yes, the linktrace response is sent to the originator only if the egress port for the destination MAC address is known by the forwarding database and not through other methods. Select Yes or No and press **Enter**.

4. To set the Initial TTL (time to live) value for the LTM, type 3 and press **Enter**. The TTL value indicates the number of nodes (SOAM enabled L2 forwarding devices) the LTM will cross before it is dropped. The default value is 64. If the LTM TTL is 0 or 1, the LTM is not forwarded to the next node, and if 0, no LTR is generated.

5. Type a value between 2 and 255 and press **Enter**. The Linktrace Monitoring screen (Figure 11-26) opens.

6. Press **Esc** to return to the Maintenance End Point Attributes screen.

7. To send the linktrace request, type S and press **Enter**.

11.6.6.2 Monitoring a Linktrace Request

1. To see results details, on the Linktrace Monitoring screen (Figure 11-26), type S and press **Enter**. The SOAM Linktrace Report screen (Figure 11-27) opens.

2. Press **Esc** to return to the Linktrace Monitoring screen.

3. To send another Linktrace Request, type R and press **Enter**. The Linktrace Request screen (Figure 11-25) opens.

4. Press **Esc** to return to Maintenance End Point attributes screen.

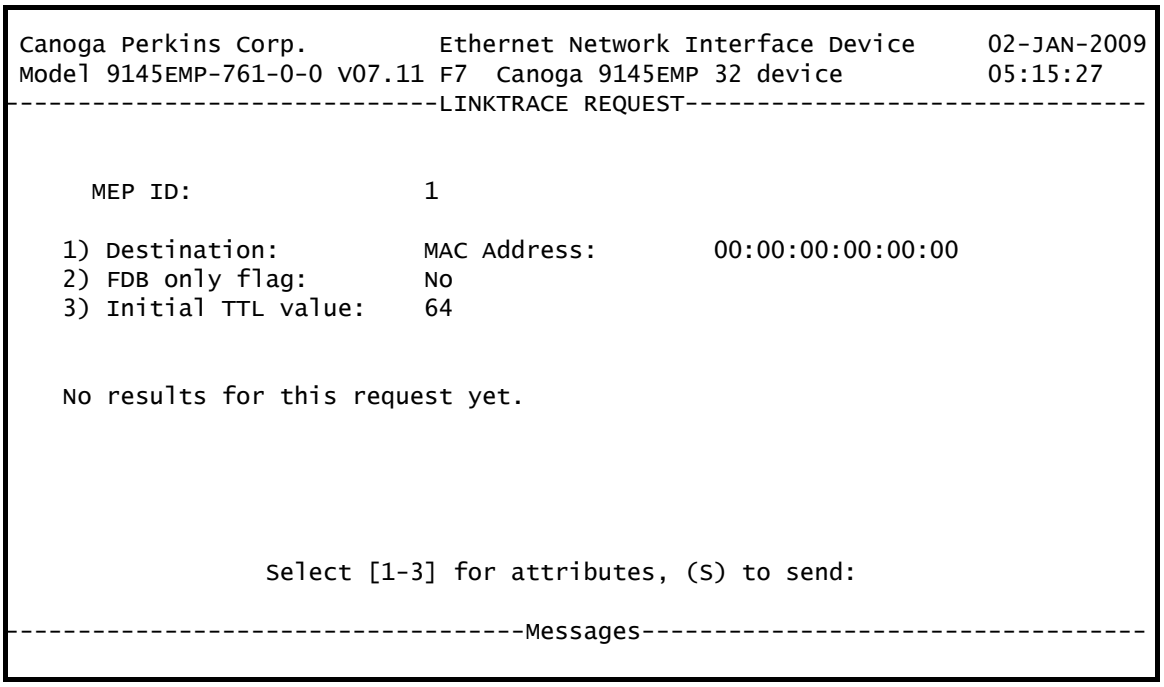
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
LINKTRACE REQUEST
MEP ID: 1
1) Destination: MAC Address: 00:00:00:00:00:00
2) FDB only flag: No
3) Initial TTL value: 64
No results for this request yet.
Select [1-3] for attributes, (S) to send:
Messages

Figure 11-25 Linktrace Request screen

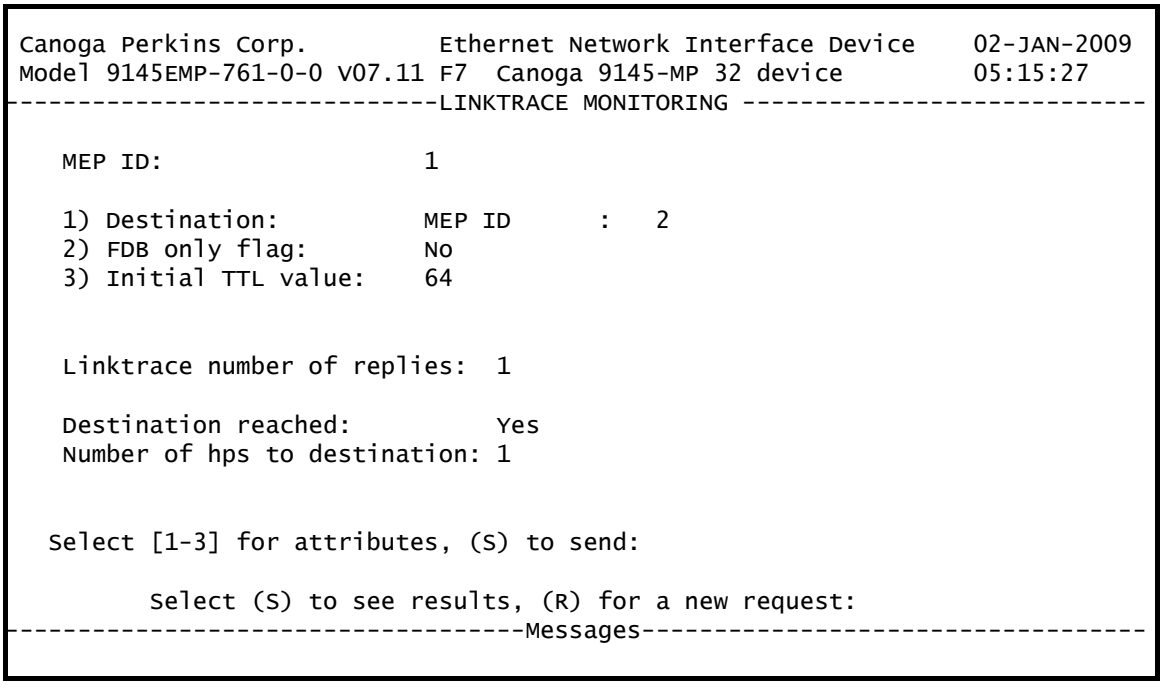
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145-MP 32 device 05:15:27
LINKTRACE MONITORING
MEP ID: 1
1) Destination: MEP ID : 2
2) FDB only flag: No
3) Initial TTL value: 64
Linktrace number of replies: 1
Destination reached: Yes
Number of hps to destination: 1
Select [1-3] for attributes, (S) to send:
Select (S) to see results, (R) for a new request:
Messages

Figure 11-26 Linktrace Monitoring screen

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27
-----------------------------SOAM LINKTRACE REPORT -----------------------------

   Source MEP ID:                       1
   Destination: Mep ID:                 2
   MAC:                                 00:40:2A:01:ED:E3
   Destination reached:                 Yes
   Number of hops to destination:       1
   Number of replies:                   1

   Reply number:                        1
   TTL:                                 62
   Responder MAC address:               00:40:2A:01:ED:E3
   LTM was forwarded:                   No
   Terminal MEP was reached:            Undefined
   Relay action:                        Undefined
   Egress action:                       Ok
   Egress address:                      00:40:2A:01:ED:E3

        Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                             R)efresh, ESC to return:
-----------------------------------Messages-----------------------------------
```

Figure 11-27 SOAM Linktrace Report screen

11.6.7 Loopback Procedures

A loopback request is initiated by a MEP to verify the connectivity to a specified target MEP or MIP in the network.

NOTE: Only one Loopback session can be active at a time for the entire system.

11.6.7.1 Initiating a Loopback Request

1. On the Maintenance End Point Attributes screen (Figure 11-20 for 802.1ag or Figure 11-21 for Y.1731), type L and press **Enter**.
    - If a Loopback request was already initiated from the MEP, a Loopback Monitoring screen (Figure 11-28 for unicast, Figure 11-29 for sweep, or Figure 11-30 for multicast) opens.
    - Otherwise, the Loopback Request screen (Figure 11-31) opens.
2. To change the loopback mode, on the Loopback Request screen, type 1 and press **Enter**.
    - For 802.1ag, select unicast regular or unicast sweep.
    - For Y.1731, select unicast regular, unicast sweep, or multicast.

Sweep loopback allows you to initiate a procedure for which the size of a loopback message is automatically incremented by 1 Byte within a preset limit.

Once you select a loopback mode, the screen will change to display only the parameters applicable to that mode. Number of packets, transmission rate, and Data TLV attributes do not apply to sweep and multicast modes.

3. To change the destination of the loopback message, type 2 and press **Enter**. Select MAC address or MEP ID. You are prompted to enter the address or ID. Type the address or ID and press **Enter**.

4. To change the priority of the request (priority bits value), type 3 and press **Enter**. Type a value between 0 and 7 and press **Enter**.

5. To change the DE (drop eligibility) bit value, type 4 and press **Enter**. The DE value indicates whether the request can be dropped. Type 0 or 1 and press **Enter**.

    - If you chose regular mode in step 1, go to step 6.
    - If you chose sweep mode in step 1, go to step 10.
    - If you chose multicast in step 1, type S to send and press **Enter**.

6. To change the Transmission rate, type 5 and press **Enter**. Type a value between 1 and 100 and press **Enter**.

7. To change the number of packets, type 6 and press **Enter**. The default is 1. A value of 0 indicates a continuous loopback. Type a value between 0 and 99 and press **Enter**.

8. To change the Data TLV size, type 7 and press **Enter**. This value indicates the amount of data in each packet. Type a value between 0 and 1488 and press **Enter**.

9. To change the Data TLV payload, type 8 and press **Enter**. Type the string that you want to send in a loopback message and press **Enter**.

10. If you chose sweep mode in step 1, you can enter a start size and end size:

    - To enter a start size, type 5 and press **Enter**. Type a number from 30 to 1488 and press **Enter**.
    - To enter an end size, type 6 and press **Enter**. Type a number from the range displayed on the screen and press **Enter**.

11. To send the loopback request, type S and press **Enter**.

12. Press **Esc** to return to the Maintenance End Point Attributes screen.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
------------------------------LOOPBACK MONITORING-----------------------------

   MEP ID:                           1
   Mode:                             Unicast regular
   Destination: MEP ID :             2
   P-Bit value:                      7
   DE bit value:                     0
   Transmission rate (pps):          66
   Number of packets:                10
   Data TLV size:                    0              LBM size:  64 (31)
   Data TLV payload:                 << randomly generated >>

   Loopback Status:       In progress

   First transaction ID:  1
   Transmitted LBMs:      8
   Received LBRs:         5

   Select (S) to stop, (R) new request:
-----------------------------------Messages-----------------------------------
```

Figure 11-28 Unicast Loopback Monitoring screen

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
------------------------------LOOPBACK MONITORING-----------------------------

   MEP ID:                           1
   Mode:                             Unicast sweep
   Destination:                      MAC Address: 01:80:C2:00:00:36
   P-Bit value:                      7
   DE bit value:                     0
   Start size:                       40          LBM size: 74
   End size:                         95          LBM size: 129

   Loopback Status:           In progress

   Last transmitted size:     129
   Last received size:        74
   No errored LBRs were received.


                Select (S) to stop, (R) new request:
-----------------------------------Messages-----------------------------------
```

Figure 11-29 Sweep Loopback Monitoring screen

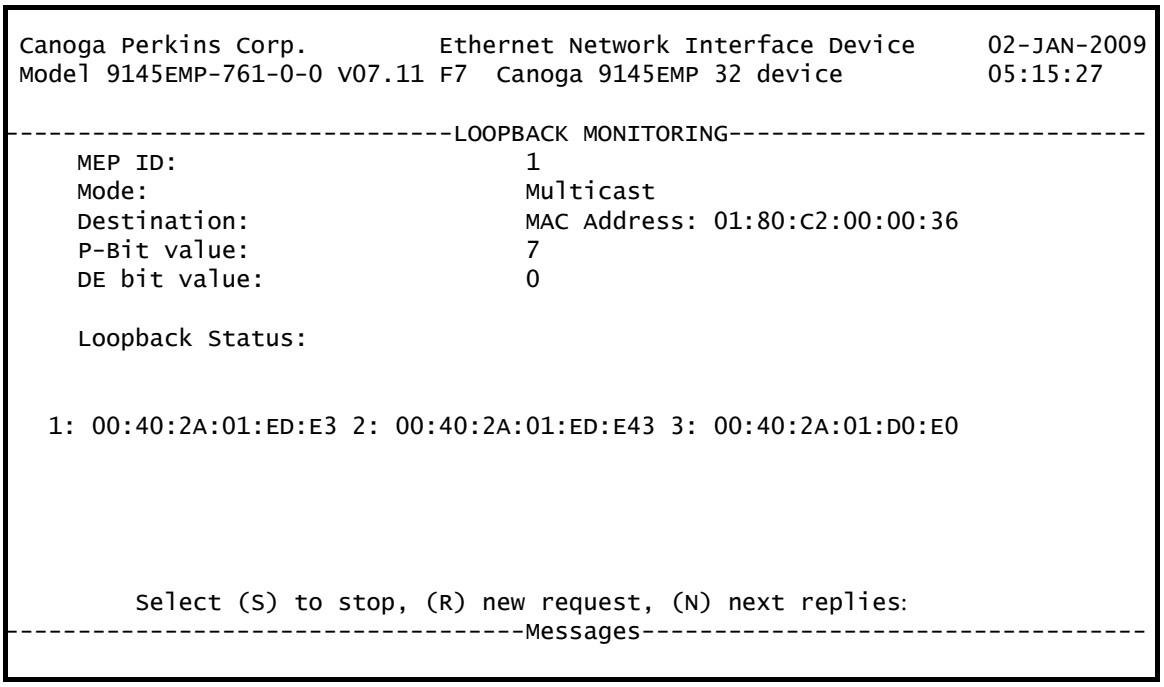
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
LOOPBACK MONITORING
MEP ID: 1
Mode: Multicast
Destination: MAC Address: 01:80:C2:00:00:36
P-Bit value: 7
DE bit value: 0
Loopback Status:
1: 00:40:2A:01:ED:E3 2: 00:40:2A:01:ED:E43 3: 00:40:2A:01:D0:E0
Select (S) to stop, (R) new request, (N) next replies:
Messages

Figure 11-30 Multicast Loopback Monitoring screen

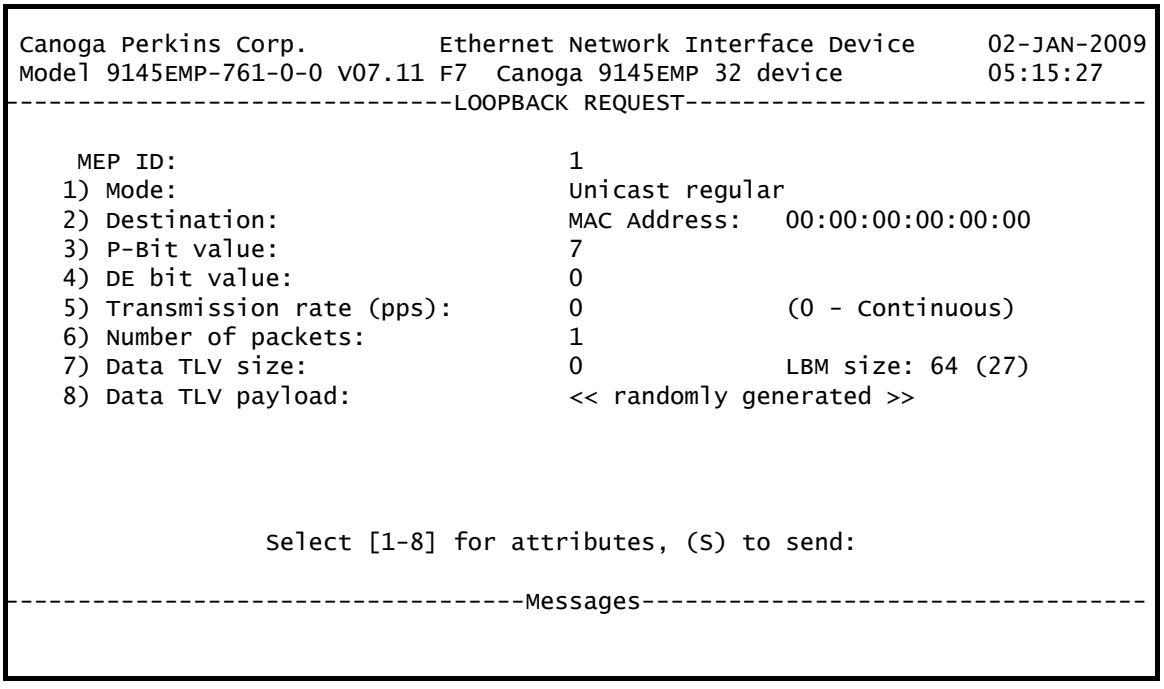
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
LOOPBACK REQUEST
MEP ID: 1
1) Mode: Unicast regular
2) Destination: MAC Address: 00:00:00:00:00:00
3) P-Bit value: 7
4) DE bit value: 0
5) Transmission rate (pps): 0 (0 - Continuous)
6) Number of packets: 1
7) Data TLV size: 0 LBM size: 64 (27)
8) Data TLV payload: << randomly generated >>
Select [1-8] for attributes, (S) to send:
Messages

Figure 11-31 Loopback Request screen (unicast regular)

11.6.7.2 Monitoring a Loopback Request

1. To stop current Loopback processing, on the Loopback Monitoring screen (Figure 11-28 for unicast, Figure 11-29 for sweep, or Figure 11-30 for multicast), type S and press **Enter**.
2. To send another Loopback Request, type R and press **Enter**. The Loopback Request screen (Figure 11-31) opens.
3. To see more Multicast Loopback results, type N and press **Enter**.
4. Press **Esc** to return to the Maintenance End Point Attributes screen.

11.7 Maintenance Intermediate Points

Maintenance Intermediate Points (MIPs) are intermediate nodes within a Maintenance Domain or Maintenance Entity Group. Up to 128 MIPs can be configured in a 9145EMP NID device. For more information, see the section "Logical Positioning of MEPs and MIPs" on page 125.

11.7.1 Display Maintenance Intermediate Points

To display a list of existing MIPs, on the SOAM Configuration screen (Figure 11-6), type 6 and press **Enter**. The Maintenance Intermediate Point List screen (Figure 11-32) opens.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27

--------------------MAINTENANCE INTERMEDIATE POINT LIST-----------------------

MIP ID   LEVEL  TYPE     PORT   MD/MEG NAME
100      1      802.1ag  USR1   19/MaintenanceAssociation_name
200      2      Y.1731   USR2   20/Provider_2









         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                (A)dd new, (D)elete, (E)dit, ESC to return:

-----------------------------------Messages-----------------------------------
```

Figure 11-32 Maintenance Intermediate Point List screen

11.7.2 Create a Maintenance Intermediate Point

1. On the Maintenance Intermediate Point List screen (Figure 11-32), type A and press **Enter**. You are prompted to enter A for 802.1ag or Y for Y.1731.

2. Type A or Y and press **Enter**. The Create a New Maintenance Intermediate Point screen (Figure 11-33 for 802.1ag or Figure 11-34 for Y.1731) opens. The MD/MEG ID field is highlighted.

3. Type an MD ID (for 802.1ag) or MEG ID (for Y.1731) and press **Enter**. (To view a list of MD/MEGs, press **CTRL-L**, type S to select, and press **Enter**). The MIP ID field is highlighted.

4. Type a MIP ID and press **Enter**. The Admin Status field is highlighted.

5. In the Admin status field, select Enabled or Disabled and press **Enter**.

6. To accept the new Maintenance Intermediate Point settings, type A and press **Enter**. The Maintenance Intermediate Point Attributes screen (Figure 11-35 for 802.1ag or Figure 11-36 for Y.1731) opens.

7. To modify an attribute value, type the number of the attribute and press **Enter**, or press **Esc** to return to return to the Maintenance Intermediate Point List screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device    02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27

-----------------CREATE A NEW MAINTENANCE INTERMEDIATE POINT--------------------




        1) MD ID             0
        2) MIP ID:           0
        3) Admin status:     Disabled









                       Select [1-3] for attributes:
-----------------------------------Messages-----------------------------------
```

Figure 11-33 Create a New Maintenance Intermediate Point screen (802.1ag)

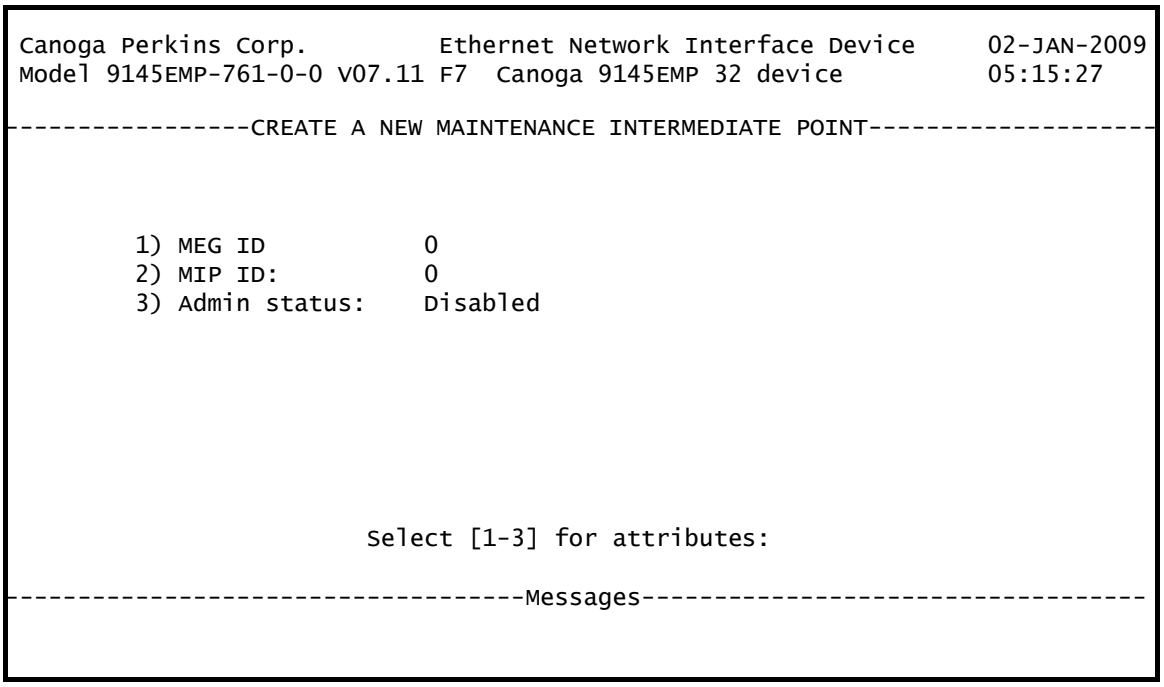
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
CREATE A NEW MAINTENANCE INTERMEDIATE POINT
1) MEG ID 0
2) MIP ID: 0
3) Admin status: Disabled
Select [1-3] for attributes:
Messages

Figure 11-34 Create a New Maintenance Intermediate Point screen (Y.1731)

11.7.3 Delete a Maintenance Intermediate Point

When you delete a Maintenance Intermediate Point, it is also deleted from the AIS client lists.

1. On the Maintenance Intermediate Point List screen (Figure 11-32), type D and press **Enter**. The current MIP is highlighted.
2. Press the Space bar to scroll through the list and highlight the entry you wish to delete.
3. Press **Enter** to delete the highlighted MIP. You are prompted to confirm the deletion.

11.7.4 Modify a Maintenance Intermediate Point

1. On the Maintenance Intermediate Point List screen (Figure 11-32), type E and press **Enter**. The current MIP is highlighted.
2. Press the Space bar to scroll through the list and highlight the entry to modify.
3. When the MIP you want to modify is highlighted, press **Enter**. The Maintenance Intermediate Point Attributes screen for that MIP (Figure 11-35 for 802.1ag or Figure 11-36 for Y.1731) opens.
4. To change the Admin Status, type 1 and press **Enter**. Select Enabled or Disabled and press **Enter**. When a MIP is disabled, it does not process any requests it receives.

5. For 802.1ag, to view the VLAN list for that MIP, type 2 and press **Enter**. The MIP's Maintenance Association List opens. If you are configuring a Y.1731 MIP, the VLAN number is displayed on the screen.

6. If you are configuring an 802.1ag MIP, type A to accept the settings and press **Enter**. Press **Esc** to return to the Maintenance Intermediate Point Attributes screen.

   If you are configuring a Y.1731 MIP, go to step 7.

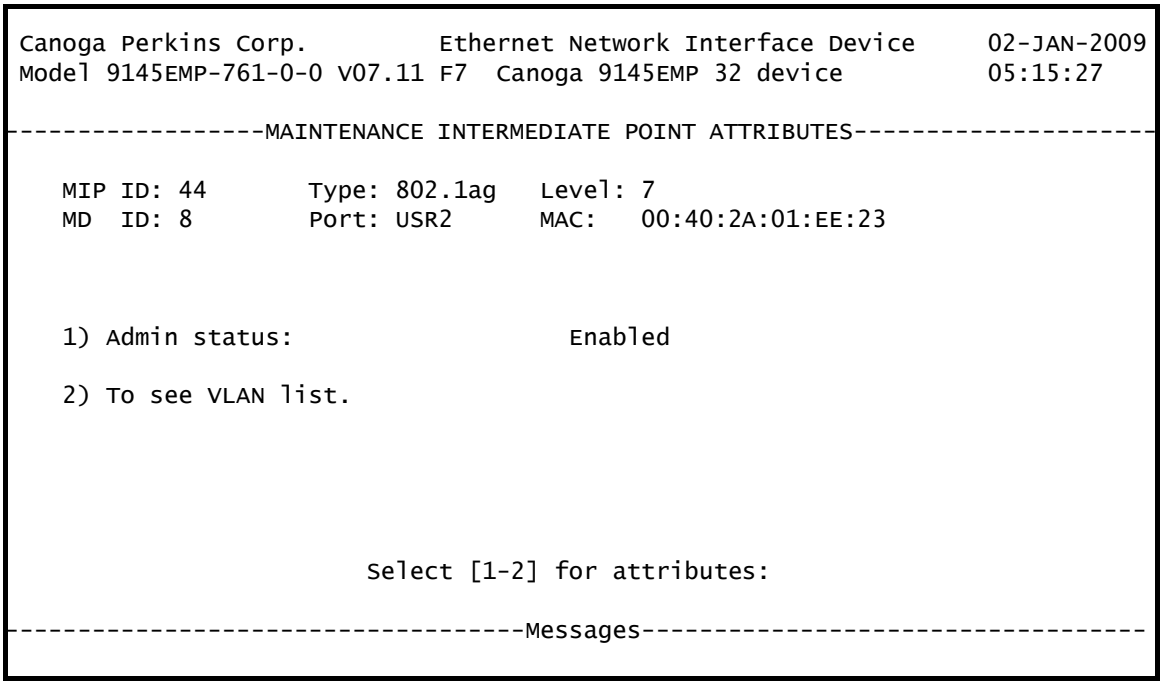
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
MAINTENANCE INTERMEDIATE POINT ATTRIBUTES
MIP ID: 44 Type: 802.1ag Level: 7
MD ID: 8 Port: USR2 MAC: 00:40:2A:01:EE:23
1) Admin status: Enabled
2) To see VLAN list.
Select [1-2] for attributes:
Messages

Figure 11-35 Maintenance Intermediate Point Attributes screen (802.1ag)

7. For Y.1731, to change the AIS Transmit interval, type 2 and press **Enter**. Select 1 sec or 1 min and press **Enter**.

8. To change the AIS priority bits, type 3 and press **Enter**. Type a number from 0 to 7 and press **Enter**.

9. Type A to accept the settings and press **Enter**. Press **Esc** to return to the Maintenance Intermediate Point Attributes screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27

------------------MAINTENANCE INTERMEDIATE POINT ATTRIBUTES---------------------

   MIP ID: 20       Type: Y.1731    Level: 7
   MEG ID: 101      Port: Network   MAC:   00:40:2A:01:EE:24



   1) Admin status:                   Disabled

     VLAN list:                       900

   2) AIS Transmit interval:1 sec
   3) AIS Priority bits:    1


                        Select [1-3] for attributes:

-----------------------------------Messages-----------------------------------
```

Figure 11-36 Maintenance Intermediate Point Attributes screen (Y.1731)

11.8 Configuration Error List

The Configuration Error List is a list of bridge ports, aggregated ports, and VIDs that are incorrectly configured. The list is updated internally for every configuration change. The following Configuration Errors can be detected on a 9145EMP NID:

- **Conflicting VIDs**: This error condition occurs when two or more MAs or MEGs in the system, at the same level, have overlapping VIDs associated with them, and for each MA, an UP MEP is configured in the system. That is, it is an error to have two UP MEPs monitoring the same VLAN, at the same level.

- **CFMLeak**: This error condition occurs when two or more MAs or MEGs, having overlapping VIDs, are configured such that for the lower level MA, there is no UP MEP associated with a given port, and there are no down MEPs in the entire system; while for the higher level MA, there is a MEP associated with a port (the port where the error is detected). That is, there is no boundary for the lower level MA in the system, while there is a boundary for the upper level MA.

To view the SOAM Configuration Errors screen:

1. On the SOAM Configuration screen (Figure 11-6), type 7 and press **Enter**. The SOAM Configuration Errors screen (Figure 11-37) opens.

2. The Configuration Error screen lists the VLAN, port, and error. Figure 11-37 shows typical errors on the user port and network ports.

3. Press **Esc** to return to the SOAM Configuration screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27
-----------------------------SOAM CONFIGURATION ERRORS-------------------------

VLAN  TYPE     PORT         Errors

100   C-Tag    USR1         CFM Leak; Conflicting VIDs
501   S-Tag    NET1         Conflicting VIDs
...




         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                                ESC to return:


-----------------------------------Messages-----------------------------------
```

Figure 11-37 SOAM Configuration Error List screen

11.9 Configure and View SOAM Statistics

Statistics can be viewed in detailed mode (one MEP or MIP per page) or as a summary in tabular mode (several MEPs/MIPs per page, one MP per row). In summary mode, five counters can be displayed for MEPs and six for MIPs.

On the Service OAM Main Menu (Figure 11-5), type 2 and press **Enter**. The SOAM Statistics screen (Figure 11-38) opens.

To reset all SOAM statistics, on the SOAM Statistics screen, type 5 and press **Enter**. You are prompted to confirm the reset (Figure 11-39).

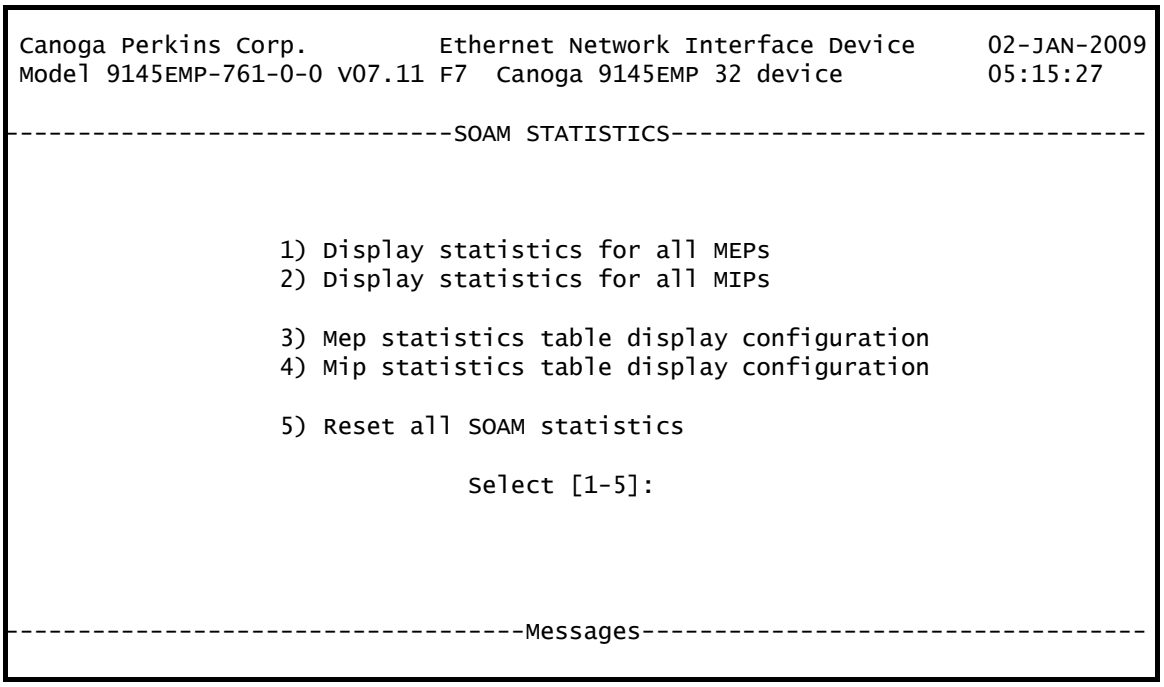
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
SOAM STATISTICS
1) Display statistics for all MEPs
2) Display statistics for all MIPs
3) Mep statistics table display configuration
4) Mip statistics table display configuration
5) Reset all SOAM statistics
Select [1-5]:
Messages

Figure 11-38 SOAM Statistics screen

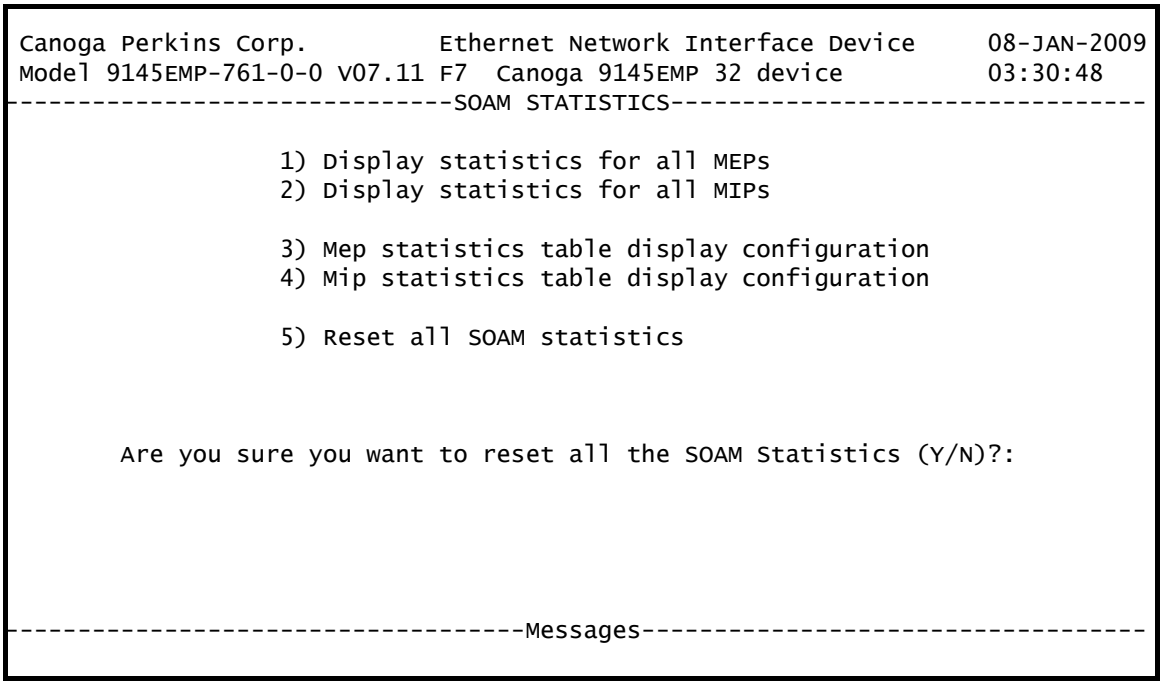
Canoga Perkins Corp. Ethernet Network Interface Device 08-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 03:30:48
SOAM STATISTICS
1) Display statistics for all MEPs
2) Display statistics for all MIPs
3) Mep statistics table display configuration
4) Mip statistics table display configuration
5) Reset all SOAM statistics
Are you sure you want to reset all the SOAM Statistics (Y/N)?:
Messages

Figure 11-39 SOAM Statistics screen resetting

11.9.1 MEP Statistics

1. To display statistics for all MEPs, type 1 and press **Enter**. The Maintenance End Point Stat Table (Figure 11-40) opens.
2. To see details, type D and press **Enter**. The current MEP is highlighted.
3. Press the Space bar to select a MEP and press **Enter**. The Maintenance End Point Statistics screen for that MEP (Figure 11-41) opens.
4. To reset all the counters to zero, type R and press **Enter**.

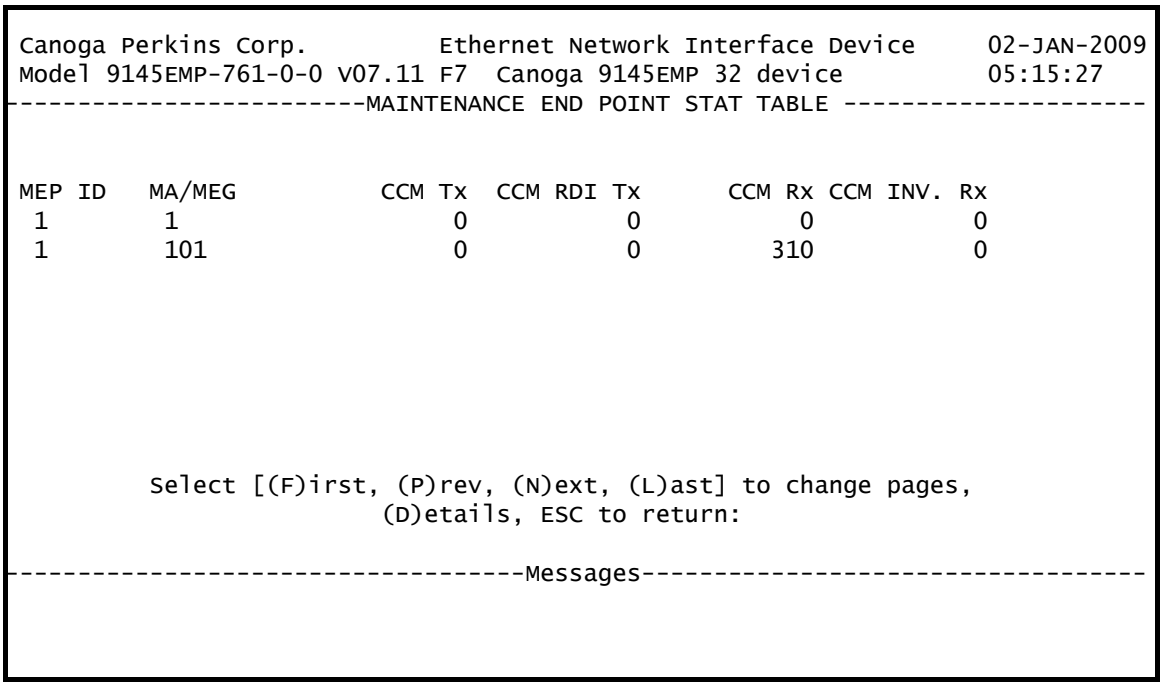
Canoga Perkins Corp. Ethernet Network Interface Device 02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 05:15:27
MAINTENANCE END POINT STAT TABLE
MEP ID MA/MEG CCM Tx CCM RDI Tx CCM Rx CCM INV. Rx
1 1 0 0 0 0
1 101 0 0 310 0
Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
(D)etails, ESC to return:
Messages

Figure 11-40 Maintenance End Point Stat Table screen

```
Canoga Perkins Corp.        Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device         05:15:27

------------------------MAINTENANCE END POINT STATISTICS-----------------------
MEP ID: 1   MA/MEG ID: 2.

        CCMs sent                                                          0
        CCM with RDI sent                                                  0
        CCMs Received                                                      0
        CCMs invalid received                                              0
        CCMs discarded due to Sender ID TLV invalid                        0
        CCMs discarded due to Port Status TLV invalid                      0
        CCMs discarded due to Interface Status TLV invalid                 0
        CCMs with sequence errors received                                 0
        CCMs with RDI bit set received                                     0
        LBMs received                                                      0
        LBRs sent                                                          0
        LBMs with bad Sender ID TLV received                               0

                  Use (N)ext page, (R)eset:

-----------------------------------Messages---------------------------------
```

Figure 11-41 Maintenance End Point Statistics screen

11.8.2 MIP Statistics

1. To display statistics for all MIPs, on the SOAM Statistics screen (Figure 11-38), type 2 and press **Enter**. The Maintenance Intermediate Point Stat Table (Figure 11-42) opens.
2. To see details, type D and press **Enter**. The current MIP is highlighted.
3. Press the Space bar to select a MIP and press **Enter**. The Maintenance Intermediate Point Statistics screen for that MIP (Figure 11-43) opens.
4. Type R to reset all the counters to zero.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           05:15:27

-----------------MAINTENANCE INTERMEDIATE POINT STAT TABLE---------------------

  MIP ID   MHF UP                              MHF DOWN
           LBM Rx     LBR Tx     LTM Rx     LBM Rx     LBR Tx     LTM Rx
   33          65         10          0         10          0          1









         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                         (D)etails, ESC to return:

-----------------------------------Messages-----------------------------------
```

Figure 11-42 Maintenance Intermediate Point Statistics screen

```
Canoga Perkins Corp.          Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           03:04:34

-----------------MAINTENANCE INTERMEDIATE POINT STATISTICS---------------------

MIP ID: 1.
                                                  MHF UP          MHF DOWN
LBMs received                                              0                 0
LBRs sent                                                  0                 0
LTMs received                                              0                 0
LTRs sent                                                  0                 0
LTMs forwarded                                             0                 0
Total discarded                                            0                 0
AISs sent                                                  0                 0
AISs true up notify received                               0                 0
AISs false up notify received                              0                 0


                        Use (R)eset:

-----------------------------------Messages-----------------------------------
```

Figure 11-43 Maintenance Intermediate Point Statistics screen

11.8.3 Statistics Display Confirmation

The 9145EMP NID allows you to monitor a summary of MIP or MEP statistics in tabular form. To configure which statistics are included in the tabular display, use the following steps.

11.8.3.1 MEP Statistics

1. For MEP statistics, on the SOAM Statistics screen (Figure 11-38), type 3 and press **Enter**. The MEP Summary Statistics Configuration screen (Figure 11-44) opens.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
--------------------MEP SUMMARY STATISTICS CONFIGURATION-----------------------

     Select up to 5 counters, current selected: 5

 1) CCMs sent:                    Yes     2) CCM with RDI sent:           Yes
 3) CCMs Received:                Yes     4) CCMs invalid received:       Yes

 5) LBMs received:                No      6) LBRs sent:                   No

 7) LBMs sent:                    No      8) LBRs in order received:      No
 9) LBRs out of order received:   No     10) LBRs with bad MSDU received: No

11) LTMs sent:                    No     12) LTRs received:              No

13) LTMs received:                No     14) LTRs sent:                  No
15) AISs sent:                    Yes    16) AISs received:              No


                        Select [1-16] for counters:

-----------------------------------Messages-----------------------------------
```

Figure 11-44 MEP Summary Statistics Configuration screen

2. You can select up to five items to view. Type the number of the counter and use the Space bar to select yes or no. The summary statistics configuration applies to all UI sessions in the system.
3. Type A to accept the settings and press **Enter**.
4. Press **Esc** to return to the SOAM Statistics screen

11.8.3.2 MIP Statistics

1. For MIP statistics, on the SOAM Statistics screen (Figure 11-38), type 4 and press **Enter**. The MIP Summary Statistics Configuration screen (Figure 11-45) opens.
2. You can select up to six items to view. Type the number of the counter and press the Space bar to select Yes or No.
3. Type A to accept the settings and press **Enter**.
4. Press **Esc** to return to the SOAM Statistics screen.

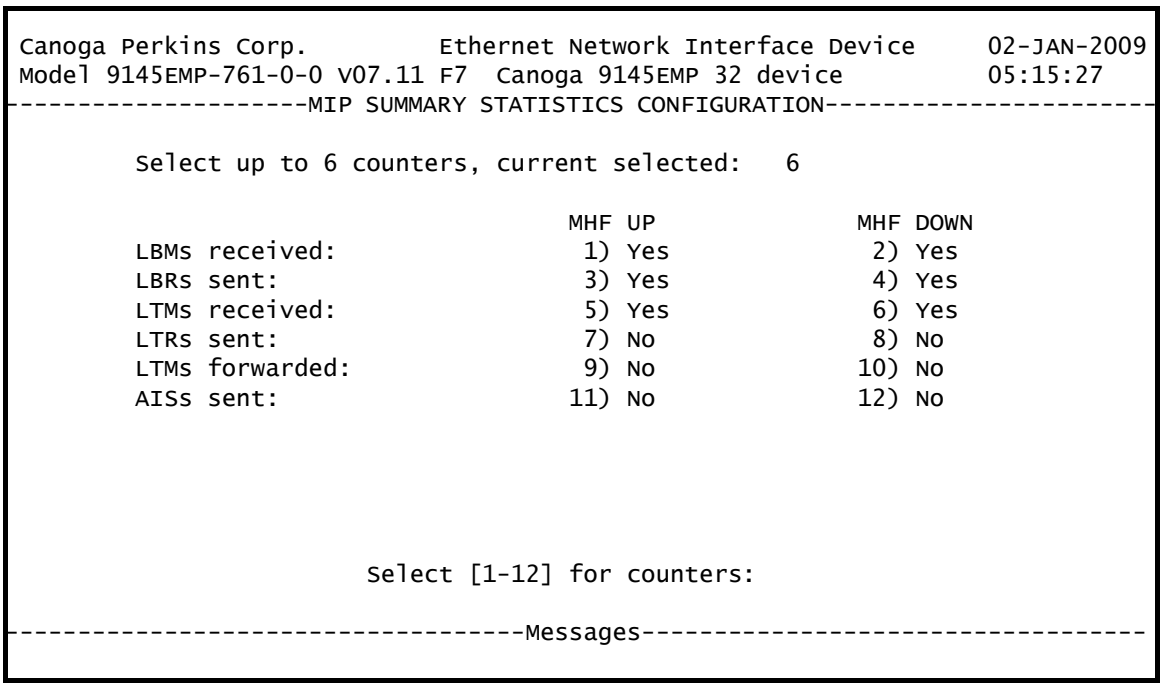

Figure 11-45 MIP Summary Statistics Configuration screen

11.9 AIS Configuration

NOTE: AIS applies to Y.1731 procedures only.

Configuring Alarm Indication Signal (AIS) establishes a relationship between a lower level MEP (the server that detects an error condition) and higher level MEPs or MIPs (the clients that must be notified by the server about an error condition). When a defect is detected by the server MEP, higher level MEPs or MIPs (clients) are notified and generate AIS frames toward their peers. Up to four clients can be configured for each MEP AIS server

Use the following steps to configure AIS:

1. On the Service OAM Main Menu (Figure 11-5), type 3 and press **Enter**. The SOAM AIS Configuration screen (Figure 11-46) opens.
2. To configure AIS notification, type E and press **Enter**. The current Maintenance Evaluation Point is highlighted.
3. Press the Space bar to scroll through the list and highlight the entry you wish to configure.
4. When the MEP you want to modify is highlighted, press **Enter**. The AIS Server Configuration screen for that MEP (Figure 11-47) opens.
5. To enable AIS notification, type 1 and press **Enter**. Select Enabled and press **Enter**.
6. To add a MEP client, type 2 and press **Enter**. You are prompted to enter the MEP client MEG ID.
   - Type the MEG ID and press **Enter**. You are prompted to enter a MEP client MEP ID.
   - Type the MEP ID and press **Enter**. The new MEP client appears on the screen.
7. To delete an existing MEP client, type 3 and press **Enter**. You are prompted to enter the MEP client MEG ID.
   - Type the MEG ID and press **Enter**. You are prompted to enter a MEP client MEP ID.
   - Type the MEP ID and press **Enter**. The MEP client is deleted from the screen.
8. To add a MIP client, type 4 and press **Enter**. You are prompted to enter the MIP client MIP ID.
   - Type the MIP ID and press **Enter**. The new MIP client appears on the screen.
9. To delete an existing MIP client, type 5 and press **Enter**.
   - Type the MIP ID and press **Enter**. The MIP client is deleted from the screen.
10. Type A to accept the settings and press **Enter**.
11. Press **Esc** to return to the SOAM AIS Configuration screen.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
---------------------------SOAM AIS CONFIGURATION-----------Display 1 - 1 of 1-

MEP ID   AIS Notification    AIS Clients list
1        Disabled

         Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
                           (E)dit, ESC to return:

-----------------------------------Messages-----------------------------------
```

Figure 11-46 SOAM AIS Configuration screen

```
Canoga Perkins Corp.         Ethernet Network Interface Device     02-JAN-2009
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          05:15:27
---------------------------AIS SERVER CONFIGURATION---------------------------

   MEP ID: 567      Direction: Down      Level: 1
   MEG ID: 66       Port:      USR2      MAC:   00:40:2A:01:F7:BB

   1) Notify status:        Disabled

      MEP Clients:          2/78

   2) Add MEP Client.
   3) Remove MEP Client.

      MIP Clients:          200

   4) Add MIP Client.
   5) Remove MIP Client.

                        Select [1-5] for attributes:

-----------------------------------Messages-----------------------------------
```

Figure 11-47 AIS Server Configuration screen

Chapter 12

VLAN Multiplexing

12.0 Introduction

The 9145EMP supports VLAN multiplexing of C-VLANs into S-VLANs. This feature allows customer frames to be multiplexed into S-VLANs through the use of a C-VLAN/S-VLAN Map.

The C-VLAN/S-VLAN Map provides a means for ingress service frames at the User Ports to be uniquely assigned to S-VLAN and forwarded out the Network Ports. Similarly, ingress service frames at the Network Ports are forwarded to a unique User Port based on the S-Tag of the frame.

12.1 VLAN Multiplexing

This section briefly describes the functionality of the VLAN Multiplexing feature, and the entities required for its configuration.

12.1.1 VLAN Multiplexing Records

The VLAN Multiplexing record is the entity that models the transport functionality of the system. There are a maximum of 512 VLAN multiplexing records in the system.

A VLAN multiplexing record links a User port and a set of C-VLANs on that particular port, with a unique S-VLAN on the network side. The record is uniquely identified in the system by the S-VLAN ID.

Service Multiplexing records and All-to-One Bundling records differ in the following ways.

- Service Multiplexing allows frames belonging to selected C-VLANs to be multiplexed in a single S-VLAN on the network side. More than one service multiplexing record can be configured on the same user port.

- An All-to-One Bundling multiplexing record indicates that all frames received on the specified user port, if they are C-VLAN tagged or untagged, are multiplexed in a single S-VLAN tag.

The following restrictions are enforced for the consistency of VLAN multiplexing records:

- If a user port has All-to-One Bundling configured on it, no other VLAN multiplexing records can be configured on that port. Similarly, if a Service Multiplexing record exists on a user port, no All-to-One record can be configured on that particular port.

- A VLAN multiplexing record can contain only C-VLANs from a single user port. VLAN multiplexing records do not span across user ports.

- A C-VLAN can belong to only one VLAN multiplexing record per port.

- The S-VLAN of the VLAN multiplexing record is unique across the system.

12.1.2 User-to-Network Functionality

On the user ports, the system accepts all Ethernet framing formats supported by 802.1ad-2005 standard. Frames are classified as:

- Priority tagged frames (Ethertype 0x8100, VID 0)

- C-Tagged frames (Ethertype 0x8100, VID != 0)

- Untagged frames that are neither priority tagged nor C-Tagged. Hence S-tagged frames and all other types of tagging are treated as untagged frames on the User side port.

Based on the frame tagging and VLAN Multiplexing records configured on the ingress port, the frame is forwarded to the network port, tagged with a specific S-Tag as an outer tag.

If there is no corresponding VLAN Multiplexing record for the ingress C-Tag, the frame is dropped.

12.1.3 Network-to-User Functionality

On the network port, the system accepts S-Tagged frames, namely frames tagged with Ethertype 0x88a8 and a non-zero VID. Untagged frames are accepted, for example, PDUs for a low-level untagged MEP, or control protocol frames.

If there is a VLAN multiplexing record corresponding to the ingress S-Tag, the frame is forwarded to the User port indicated by the record, and stripped of the S-Tag. If no VLAN Multiplexing record is found, the frame is dropped.

12.1.4 Statistics

A VLAN multiplexing record keeps statistics, as follows:

For an All-to-One Bundling VLAN multiplexing record, the following counters are kept:

- Number of transmitted frames and bytes at the User Port

- Number of received frames and bytes at User Port

- Number of transmitted frames and bytes on the Network Port
- Number of received frames and bytes on the Network Port

For a Service Multiplexing VLAN multiplexing record, the user can select between S-VLAN level statistics records, and C-VLAN level statistics records.

For S-VLAN level statistics, the following counters are kept:

- Number of transmitted frames and bytes on the Network Port
- Number of received frames and bytes on the Network Port
- Total number of transmitted frames and bytes at the User Port
- Total number of received frames and bytes at the User Port

For C-VLAN level statistics, the following records are kept:

- Number of transmitted frames and bytes on the Network Port
- Number of received frames and bytes on the Network Port
- Total number of transmitted frames and bytes at User Port
- Total number of received frames and bytes at User Port
- Per C-VLAN number of transmitted frames and bytes at User Port
- Per C-VLAN number of received frames and bytes at User Port

The number of statistics records per system is limited to 128. A VLAN Multiplexing record that has statistics enabled at C-VLAN level uses one statistic record for each C-VLAN in the Service Multiplexing record.

12.1.5 Screen Navigation

VLAN multiplexing is configured using the menus described in this chapter. The menu hierarchy for VLAN multiplexing is illustrated in Figure 12-1.

To select an item on a screen, type the number of the item and press **Enter**. The setting will be highlighted. To toggle between values within that item, press the Space bar.

If there is more than one page, the screen will offer the option of using (F)irst, (P)rev, (N)ext, and (L)ast to navigate. Press Esc to return to a previous screen.

All screens that show existing objects are refreshed automatically every 5 seconds; items that are being modified are not refreshed.

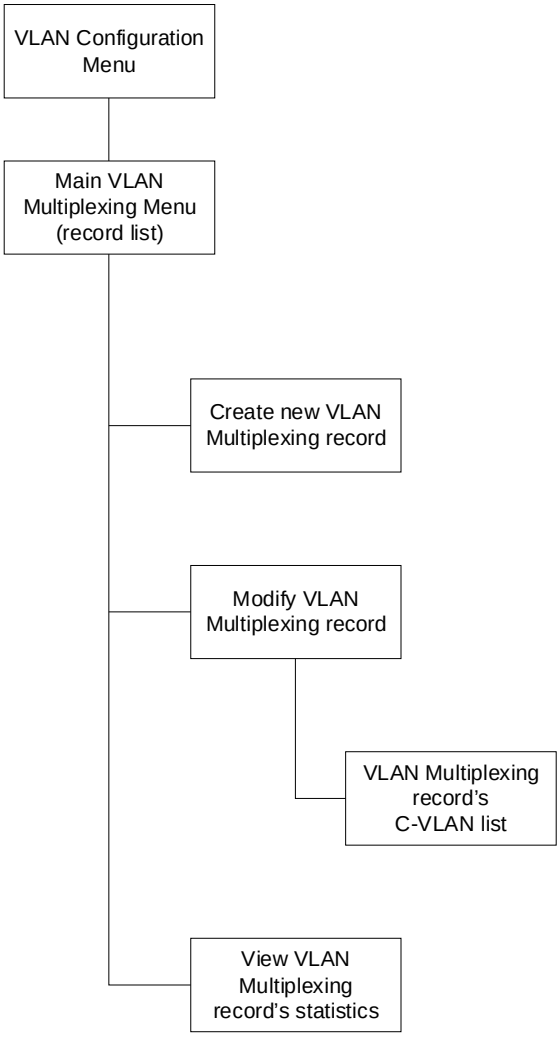
VLAN Configuration Menu
Main VLAN Multiplexing Menu (record list)
Create new VLAN Multiplexing record
Modify VLAN Multiplexing record
VLAN Multiplexing record's C-VLAN list
View VLAN Multiplexing record's statistics

Figure 12-1 VLAN Multiplexing menu hierarchy

12.2 VLAN Multiplexing Configuration

Use the following steps to navigate to the VLAN Multiplexing Records List. The Record List is the main entry point to VLAN Multiplexing configuration and Statistics monitoring. It displays all VLAN Multiplexing records in the system. Each VLAN Multiplexing record is uniquely identified by the S-VLAN ID.

1. On the Main Menu (Figure 12-2), type 12 and press **Enter**. The VLAN Multiplexing Record List (Figure 12-3) opens.

```
Canoga Perkins Corp.        Ethernet Network Interface Device     02-JAN-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device         05:15:27
---------------------------------MAIN MENU-------------------------------------


                              1) System Configuration
                              2) Diagnostics
                              3) Port Information
                              4) System Alarms
                              5) System Log
                              6) Utilities
                              7) Software Upgrade
                              8) Manage Logged In Users
                              9) Link OAM
                             10) CoS Configuration
                             11) Service OAM
                             12) VLAN Multiplexing
                             13) Logout

                              Select [1-13]:
```

Figure 12-2 Main Menu

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:26:41
------------------------VLAN MULTIPLEXING RECORD LIST-------Display 1 - 2 of 2-

S-VLAN   USER       MULTIPLEXING   NAME         STATISTICS      OPERATIONAL
ID       INTERFACE  TYPE                                        STATE
1        USR1       All-to-One      Name1       S-VLAN          DOWN
10       USR2       Service Mux     Name2       Disabled        Up
11       USR2       Service Mux    <no-name>    C-VLAN          Down
12       USR2       Service Mux    <no-name>    C-VLAN          Up
100      USR3       Service Mux    <no-name>    Disabled        Up
101      USR3       Service Mux    Location1    C-VLAN          Down
103      USR3       Service Mux    Customer1    Disabled        Down
2000     USR4       All-to-One     Port4        Disabled        Up



            Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
            (A)dd new, (D)elete, (E)dit, (S)tatistics, ESC to return:

-----------------------------------Messages-----------------------------------
```

Figure 12-3 VLAN Multiplexing Record List screen

12.2.1 Create a VLAN Multiplexing Record

1. On the VLAN Multiplexing Record List screen (Figure 12-3), type A and press **Enter**. The Create A New VLAN Multiplexing Record (Figure 12-4) screen opens.
2. In the S-VLAN field, type an ID number and press **Enter**. The User Interface field is highlighted.
3. In the User Interface field, press the Space bar to select USR1, USR2, USR3, or USR4, and press **Enter**. The Name field is highlighted.
4. In the Name field, type name for the record and press **Enter**. The Multiplexing Type field is highlighted.
5. In the Multiplexing Type field, use the Space bar to select Service Multiplexing or All-to-One and press **Enter**. The Administrative State field is highlighted.
6. In the Administrative State field, use the Space bar to select Up or Down. and press **Enter**. The Statistics field is highlighted.
7. In the Statistics field, use the Space bar to select Disabled, S-VLAN, or C-VLAN and press **Enter**. The S-Tag P-bits field is highlighted.
8. In the S-Tag P-bits field, use the Space bar to select Static or Copy from Ingress, and press **Enter**.
9. For Static P-bits mode, specify a P-bits value between 0-7.

10. To accept the new VLAN Multiplexing Record settings, type A and press **Enter**. The Modify VLAN Multiplexing Record screen (Figure 12-5) opens.

11. To modify an attribute value, type the number of the attribute and press **Enter**, or press **Esc** to return to the VLAN Multiplexing Record List screen.

```
Canoga Perkins Corp.          Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device           00:26:41
--------------------CREATE A NEW VLAN MULTIPLEXING RECORD-----------------------

   1) S-VLAN ID:                  10
   2) User Interface:             USR1
   3) Name:                       Name1
   4) Multiplexing type:          Service Mux
   5) Administrative state:       UP
   6) Statistics:                 Disabled
   7) S-Tag P-Bits:               Copy from ingress
      Static P-Bits Value









                    Select [1-7] for attributes, (A) to Accept:

-----------------------------------Messages-----------------------------------
```

Figure 12-4 Create a New VLAN Multiplexing Record screen

12.2.2 Delete a VLAN Multiplexing Record

NOTE: A VLAN multiplexing record cannot be deleted if SOAM entities are configured on it.

1. On the VLAN Multiplexing Record List screen (Figure 12-3), type D and press **Enter**. The current VLAN Multiplexing Record is highlighted.

2. Press the Space bar to scroll through the list and highlight the record you wish to delete.

3. Press **Enter** to delete the highlighted record. You are prompted to confirm the deletion.

12.2.3 Modify a VLAN Multiplexing Record

1. On the VLAN Multiplexing Record List screen (Figure 12-3), type E and press **Enter**. The current record is highlighted.

2. Press the Space bar to scroll through the list and highlight the record to modify. When the record you want to modify is highlighted, press **Enter**. The Modify VLAN Multiplexing Record screen (Figure 12-5) opens.

3. To change the Administrative State, type 1 and press **Enter**. Press the Space bar to select Up or Down, and press **Enter**.

4. To change the statistics display, type 2 and press **Enter**. Press the Space bar to select S-VLAN, C-VLAN, or Disabled, and press **Enter**.

   If you set the statistics mode for a service multiplexing record to C-VLAN then you can see the service multiplexing statistics detailed at C-VLAN level (as in Figure 12-9).

5. To change the S-Tag P-Bits value, type 3 and press **Enter**. Press the Space bar to select Static or Copy from Ingress, and press **Enter**.

6. To view or modify the C-VLAN list, type 4 and press **Enter**. The VLAN Multiplexing Record C-VLAN List screen (Figure 12-6) opens.

   - To add a C-VLAN, type 1 and press **Enter**. You are prompted to type 1-4094, (U)ntagged, or (P)riority tagged and press **Enter**. Enter the C-VLAN IDs that you wish to be included in the service multiplexing, one by one. Priority VLAN tagged frames and untagged frames can be explicitly included in the VLAN multiplexing record as well.

   - To delete a C-VLAN, type 2 and press **Enter**. You are prompted to type 1-4094, (U)ntagged, or (P)riority tagged and press **Enter**. Delete the C-VLAN IDs that you do not wish to include in the service multiplexing.

   Press **Esc** to return to the Modify VLAN Multiplexing Record screen.

7. When you are finished making changes, type A to accept.

8. Press **Esc** to return to the VLAN Multiplexing Record List screen.

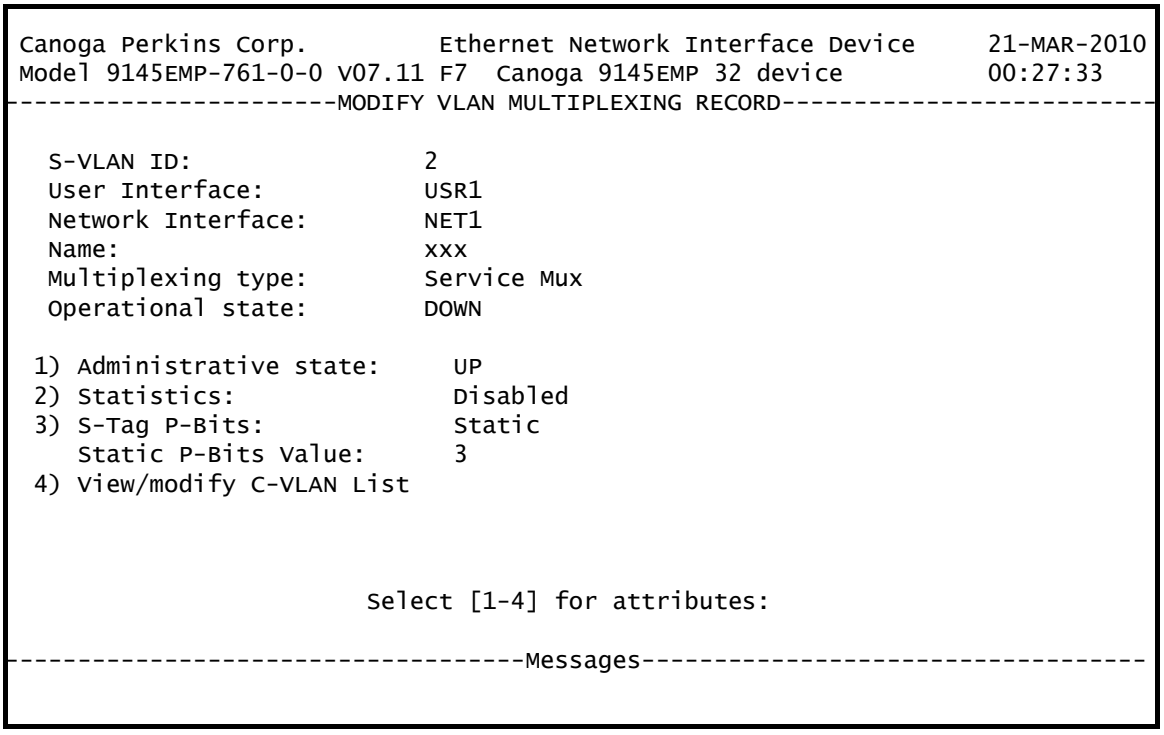

Figure 12-5 Modify VLAN Multiplexing Record screen

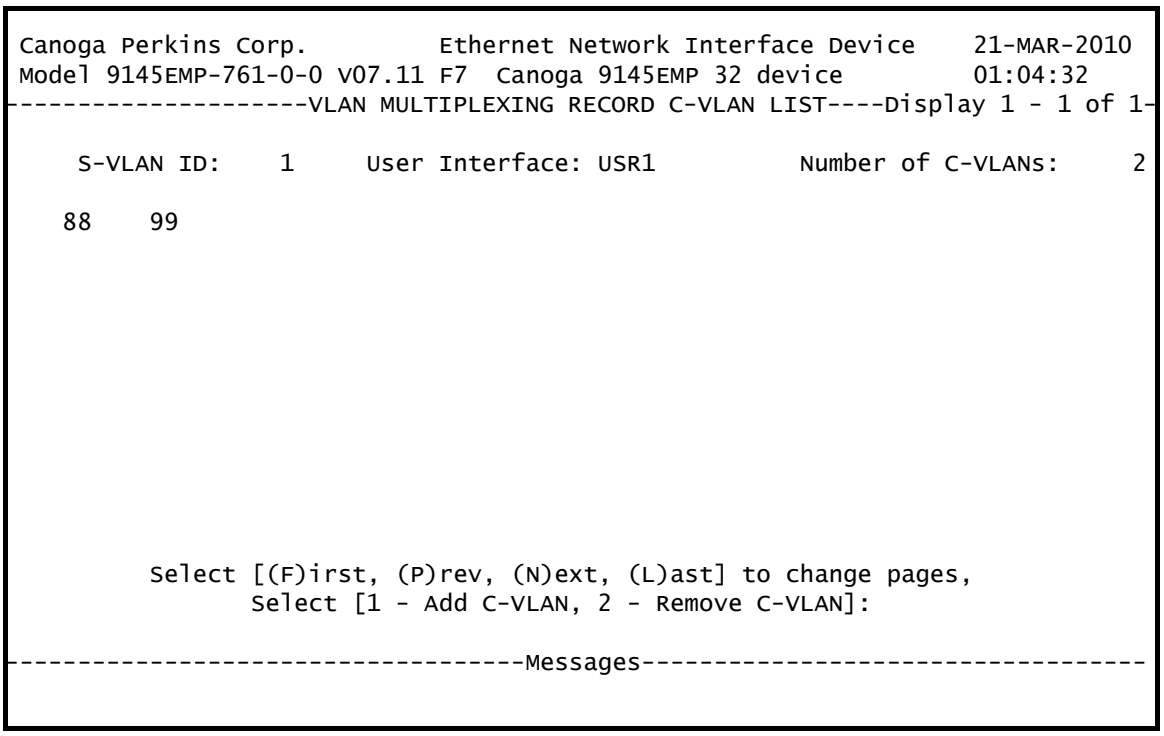
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7 Canoga 9145EMP 32 device 01:04:32
VLAN MULTIPLEXING RECORD C-VLAN LIST----Display 1 - 1 of 1
S-VLAN ID: 1 User Interface: USR1 Number of C-VLANs: 2
88 99
Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
Select [1 - Add C-VLAN, 2 - Remove C-VLAN]:
Messages

Figure 12-6 VLAN Multiplexing Record C-VLAN List screen

12.2.4 Display Statistics for a VLAN Multiplexing Record

VLAN statistics can be displayed in both raw and current mode. Press **CTRL-T** to toggle between the two modes.

1. On the VLAN Multiplexing Record List screen (Figure 12-3), type S and press **Enter**. The current VLAN Multiplexing Record is highlighted.
2. Press the Space bar to scroll through the list and highlight the record for which you want to display statistics.
3. Press **Enter** to select a highlighted record. The VLAN Multiplexing Record Statistics screen (Figure 12-7) opens.
4. To view raw statistics (Figure 12-8), press **CTRL-T**.
5. Press **Esc** to return to the VLAN Multiplexing Record List screen.

.

```
Canoga Perkins Corp.         Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          01:07:14
---------------VLAN MULTIPLEXING RECORD STATISTICS (CURRENT)-------------------

      S-VLAN ID:                          1
      User Interface:                     USR1
      Network Interface:                  NET1
      Multiplexing type:                  Service Mux
      C-VLAN level statistics:            Enabled

Rx Frames at user port    0           Rx Frames at network port  0
Tx Frames at user port    0           Tx Frames at network port  0

Rx Bytes at user port     0           Rx Bytes at network port   0
Tx Bytes at user port     0           Tx Bytes at network port   0




      Select [CTRL-T - current/raw, (R)eset counters, ESC to return]:

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```

Figure 12-7 VLAN Multiplexing Record Statistics (Current) screen

```
Canoga Perkins Corp.         Ethernet Network Interface Device     21-MAR-2010
Model 9145EMP-761-0-0 V07.11 F7  Canoga 9145EMP 32 device          01:06:27
---------------VLAN MULTIPLEXING RECORD STATISTICS (  RAW  )-------------------

      S-VLAN ID:                          1
      User Interface:                     USR1
      Network Interface:                  NET1
      Multiplexing type:                  Service Mux
      C-VLAN level statistics:            Disabled

Rx Frames at user port    0           Rx Frames at network port  0
Tx Frames at user port    0           Tx Frames at network port  0

Rx Bytes at user port     0           Rx Bytes at network port   0
Tx Bytes at user port     0           Tx Bytes at network port   0




      Select [CTRL-T - current/raw, (R)eset counters, ESC to return]:

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```

Figure 12-8 VLAN Multiplexing Record Statistics (Raw) screen

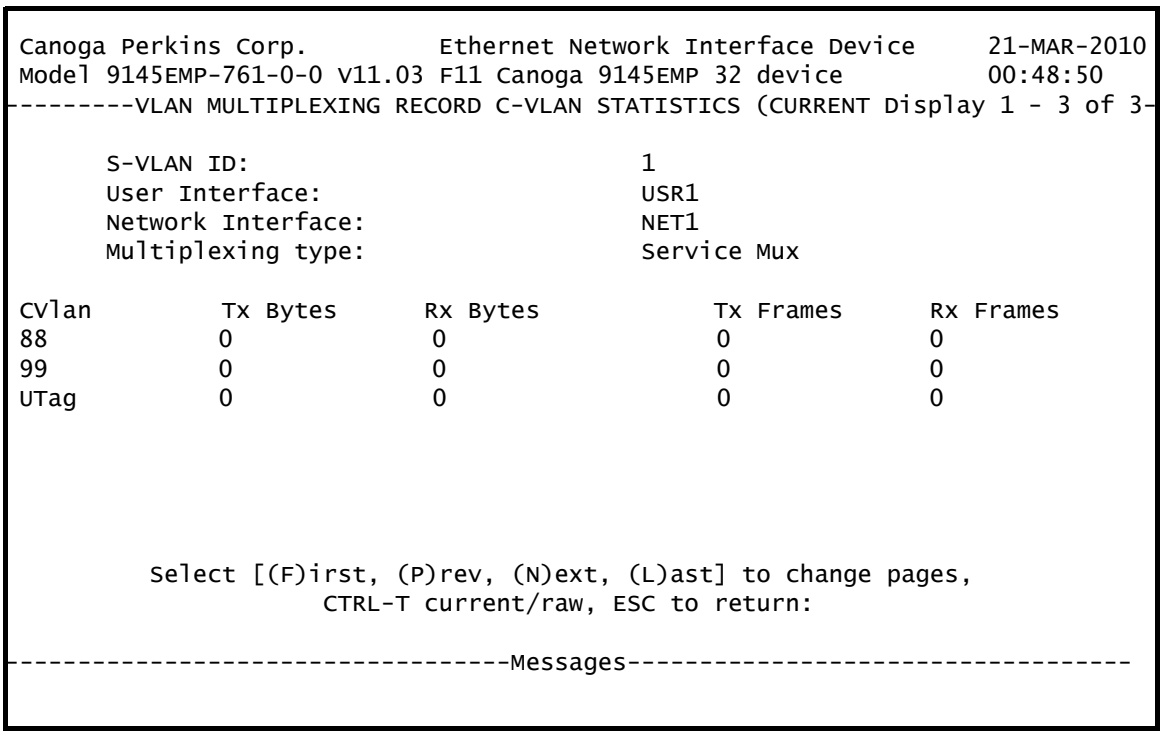
Canoga Perkins Corp. Ethernet Network Interface Device 21-MAR-2010
Model 9145EMP-761-0-0 V11.03 F11 Canoga 9145EMP 32 device 00:48:50
VLAN MULTIPLEXING RECORD C-VLAN STATISTICS (CURRENT Display 1 - 3 of 3
S-VLAN ID: 1
User Interface: USR1
Network Interface: NET1
Multiplexing type: Service Mux
CVlan Tx Bytes Rx Bytes Tx Frames Rx Frames
88 0 0 0 0
99 0 0 0 0
UTag 0 0 0 0
Select [(F)irst, (P)rev, (N)ext, (L)ast] to change pages,
CTRL-T current/raw, ESC to return:
Messages

Figure 12-9 C-VLAN Level Statistics screen

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